Available online on 15.01.2019 at http://jddtonline.info

Journal of Drug Delivery and Therapeutics

Open Access to Pharmaceutical and Medical Research

Open Access Research Article

Occurrence of anemia among the people of Gurugram, Haryana: a cross sectional study

Ashok Kumar Sah* and Rajesh Prasad Jayaswal

Department of Medical Laboratory Technology, Amity Medical School, Amity University Haryana, India

ABSTRACT

Anemia is considered a condition, not a disease in which numbers of red blood cells (RBCs) are insufficient to meet the body's metabolical and physiological needs for oxygen. Anemia may also develop due to nutritional deficiencies such as iron, vitamin B12, folic acid, and vitamin A; moderate and severe inflammation; parasitic infestation; and acquired or inherited disorders that affect hemoglobin synthesis, red blood cell development or red blood cell endurance. This proposed work depicts the distribution of different morphological types of anemia on people of Gurugram, Haryana. All the samples were analyzed for CBC and peripheral blood smear by using Sysmax (three parts) hematology analyzer and microscopy. In the present study, 300 patients in 6 months study period were included to diagnose anemia. Only 166 cases were positive. Out of 166 cases, 85 (51.2%) were female and 81 (48.8%) were male. The highest number of participants showed RBCs count in the range of 4.5-5.5 million/mm^3, 24 (14.5%) with P value 0.000. Most of the cases that we revealed were having hypochromic red cells along with morphological variation in RBCs which may be due to iron deficiency. The further confirmatory analysis may be required in order to know the detail classification of anemia.

Keywords: Anemia, Hemoglobin, Iron Deficiency, Hypochromic, Red Blood Cells

Article Info: Received 28 Nov 2018; Review Completed 06 Jan 2019; Accepted 09 Jan 2019; Available online 15 Jan 2019

Cite this article as:

Sah AK, Jayaswal RP, Occurrence of anemia among the people of Gurugram, Haryana: a cross sectional study, Journal of Drug Delivery and Therapeutics. 2019; 9(1):202-206 DOI: http://dx.doi.org/10.22270/jddt.v9i1.2288

***Address for Correspondence:**

Ashok Kumar Sah, Amity Medical School, Amity University Haryana, India.

INTRODUCTION

Anemia is a global health issues affecting both male and female of all age groups. In such condition, the body is incapable to meet the need for oxygen through the limited number of red cells. This need varies individual to individual due to variation in gender, age, environment (altitude), smoking habits, and also during different stages of pregnancy. Iron deficiency is thought to be the most common cause of anemia globally. In addition, anemia may also develop due to other nutritional deficiencies such as vitamin B12, folic acid, and vitamin A; moderate and severe inflammation; parasitic infestation; and acquired or inherited disorders that affect hemoglobin synthesis, red blood cell development or red blood cell endurance.

Anemia is a condition, not a disease, but it is the reflection of underlying diseases and from the treatment point of view, it is essential to identify the etiology of anemia. The definition of anemia is as a decrease in the number of red blood cells or the decreased percentage of hemoglobin in the blood [1]. It can also be termed as a reduction of more than 10% of the normal value of a total number of red blood cells, the amount of circulating hemoglobin and RBC mass of a particular individual [2]. Formally anemia is said to be decreasing in RBC, hemoglobin, and hematocrit below the previously established normal values for healthy persons of the same age, gender, and race and under similar environmental conditions. Its diagnosis is made from the signs and symptoms, physical examination, history, hemoglobin level and other procedures and findings [3].

According to WHO, anemia is defined as if hemoglobin level less than 11 g/dl for children below six years and less than 12 g/dl for children more than six years of age and a report shows that 52.0% of pregnancies and around 35.0 to 40.0% of women are anemic in developing countries due to iron deficiency [4-6]. The situation in Nepal is more severe where 36.0% cases have been recorded in age group of 15 to 49 in which 42.0% pregnant and 40.0% lactating women have been reported as anemic[7]. A few studies carried out among adolescent girls in Nepal reported that prevalence ranges from 42 to 60.0% [8, 9].

Morphologically anemia can be classified as microcytic hypochromic anemia which characteristically shows reduced MCV (mean corpuscular volume) values (<80fl) as well as reduced MCHC (mean corpuscular hemoglobin concentration) values (30gm/dl), normocytic normochromic which has normal MCV (82-100 fl) values, macrocytic hypochromic anemia which shows characteristic increased MCV values (>100fl) and normal MCHC. The etiological method of classification involves anemias due to impaired

red cell production, hemolytic anemia due to increased red cell destruction and anemia due to blood loss in cases of trauma or injuries [3].

MATERIALS AND METHODS

The study was hospital-based cross-sectional study over a period of 6 months from January to April 2016. 300 patients between the ages of 1 to 60 years, who visited Sunrise Hospital in Gurugram, were selected and screened for anemia by performing Complete Blood Count panel and peripheral blood smear.

Hemoglobin test, packed cell volume (PCV), RBC count, Peripheral blood smear, Red cell distribution and Mean Corpuscular volume (MCV) test were the major indicators to study anemia in the patients. The test results also provided information about the severity of anemic conditions.

Patient Consent: Informed consent was taken from the patient attendees.

Inclusion criteria

• All the patients (visitors) with a hemoglobin level of less than 11 gm/dl;

• Age group of patients (1-60years)

• All acute conditions patients with an unknown diagnosis

Exclusion criteria

• Patients with hemolytic anemia and bleeding diathesis

• Patients with chronic disease and aplastic diseases

• Chronic and severe conditions of patients.

RESULTS

A total 166 of the patients were anemic in which 85 (51.2%) were female and 81 (48.8%) were male. The study showed that hypochromia 28.9%, hypochromia with iron deficiency anemia 9.6%, hypochromia and hyperchromia 27.7%, hypochromia with macrocytosis 9.6%, hyperchromia with macrocytosis 4.2%, hypochromia with normocytic 15.1%, hypochromia with both microcytic and macrocytic 4.8% in people of Gurugram. Other variables were processed as shown below (Fig 1, Table 1 to 7).

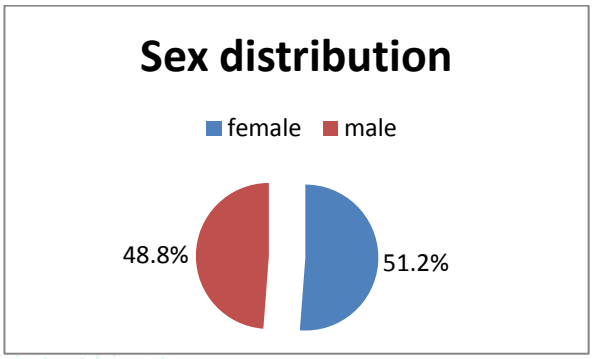

Figure 1: Shows the distribution of anemia in female 85 (51.2%) and male 81 (48.8%).

Table 1: Shows the association of anemia gender-wise

Diagnosis of diseases	Gender		Total	P value
	F	M		
Hypochromia	33(19.9%)	15(9.0%)	48(28.9%)	0.39
Hypochromia, iron deficiency anemia	6(3.6%)	10(6.0%)	16(9.6%)	
Hypochromia and Hyperchromia	22(13.3%)	24(14.5%)	46(27.7%)	
Hypochromia with Macrocytosis	10(6.0%)	6(3.6%)	16(9.6%)	
Hyperchromia with Macrocytosis	2(1.2%)	5(3.0%)	7(4.2%)	
Hypochromia with Normocytic	8(4.8%)	17(10.2%)	25(15.1%)	
Hypochromia with both Microcytic and Macrocytic	4(2.4%)	4(2.4%)	8(4.8%)	
Total	85(51.2%)	81(48.8%)	166(100.0%)	

Table 2: shows the association of anemic disease with ages

Diagnosis of diseases	Age Category							Total	P value
	< 10	10-20	20-30	30-40	40-50	50-60	>60		
Hypochromia	14(8.4%)	1(0.6%)	11(6.6%)	6(3.6%)	7(4.2%)	3(1.8%)	6(3.6%)	48(28.9%)	0.001
Hypochromia, iron deficiency anemia	0(0.0%)	2(1.2%)	0(0.0%)	2(1.2%)	3(1.8%)	4(2.4%)	5(3.0%)	16(9.6%)	
Hypochromia and Hyperchromia	11(6.6%)	3(1.8%)	10(6.0%)	4(2.4%)	3(1.8%)	8(4.8%)	7(4.2%)	46(27.7%)	
Hypochromia with Macrocytosis	0(0.0%)	1(0.6%)	1(0.6%)	0(0.0%)	2(1.2%)	3(1.8%)	9(5.4%)	16(9.6%)	
Hyperchromia with Macrocytosis	0(0.0%)	1(0.6%)	1(0.6%)	0(0.0%)	0(0.0%)	1(0.6%)	4(2.4%)	7(4.2%)	
Hypochromia with Normocytic	8(4.8%)	1(0.6%)	1(0.6%)	0(0.0%)	7(4.2%)	3(1.8%)	5(3.0%)	25(15.1%)	
Hypochromia and anaemia	0(0.0%)	0(0.0%)	1(0.6%)	3(1.8%)	0(0.0%)	0(0.0%)	4(2.4%)	8(4.8%)	

Table 3: Shows the association of RBC count with different anemic condition. (Highest number of participants showed RBC 4.5-5.5 million/mm^3 24 (14.5%) with P value 0.000)

Diagnosis of diseases	RBC count Category				Total	P Value
	<3.5	3.5-4.5	4.5-5.5	>5.5		
Hypochromia	2(1.2%)	22(13.3%)	24(14.5%)	0(0.0%)	48(28.9%)	0.000
Hypochromia, iron deficiency anemia	11(6.6%)	4(2.4%)	1(0.6%)	0(0.0%)	16(9.6%)	
Hypochromia and Hyperchromia	0(0.0%)	19(11.4%)	21(12.7%)	6(3.6%)	46(27.7%)	
Hypochromia with Macrocytosis	16(9.6%)	0(0.0%)	0(0.0%)	0(0.0%)	16(9.6%)	
Hyperchromia with Macrocytosis	7(4.2%)	0(0.0%)	0(0.0%)	0(0.0%)	7(4.2%)	
Hypochromia with Normocytic	12(7.2%)	8(4.8%)	3(1.8%)	2(1.2%)	25(15.1%)	
Hypochromia with both Microcytic and Macrocytic	8(4.8%)	0(0.0%)	0(0.0%)	0(0.0%)	8(4.8%)	

Table 4: Shows the association of hemoglobin in different type of anemia

Diagnosis of diseases	Hb Concentration					Total	P value
	Lowest through 7	8	9	10	<12		
Hypochromia	3(1.8%)	19(11.4%)	16(9.6%)	10(6.0%)	0(0.0%)	48(28.9%)	0.000
Hypochromia, iron deficiency anemia	16(9.6%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	16(9.6%)	
Hypochromia and Hyperchromia	6(3.6%)	19(11.4%)	18(10.8%)	2(1.2%)	1(0.6%)	46(27.7%)	
Hypochromia with Macrocytosis	16(9.6%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	16(9.6%)	
Hyperchromia with Macrocytosis	7(4.2%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	7(4.2%)	
Hypochromia with Normocytic	5(3.0%)	10(6.0%)	1(0.6%)	7(4.2%)	2(1.2%)	25(15.1%)	
Hypochromia with both Microcytic and Macrocytic	8(4.8%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	8(4.8%)	

Table 5: Shows the association of Packed Cell Volume (PCV) in different anemic condition

Diagnosis of diseases	PCV Value				Total	P Value
	Lowest through 30	31-35	36-40	Highest through 41		
Hypochromia	30(18.1%)	15(9.0%)	30(18.1%)	0(0.0%)	48(28.9%)	0.000
Hypochromia, iron deficiency anemia	16(9.6%)	0(0.0%)	0(0.0%)	0(0.0%)	16(9.6%)	
Hypochromia and Hyperchromia	31(18.7%)	14(8.4%)	0(0.0%)	1(0.6%)	46(27.7%)	
Hypochromia with Macrocytosis	16(9.6%)	0(0.0%)	0(0.0%)	0(0.0%)	16(9.6%)	
Hyperchromia with Macrocytosis	7(4.2%)	0(0.0%)	0(0.0%)	0(0.0%)	7(4.2%)	
Hypochromia with Normocytic	16(9.6%)	2(1.2%)	6(3.6%)	1(0.6%)	25(15.1%)	
Hypochromia with both Microcytic and Macrocytic	8(4.8%)	0(0.0%)	0(0.0%)	0(0.0%)	8(4.8%)	

Table 6: Shows the association Mean cell volume (MCV) indifferent anemic condition

Diagnosis of diseases	MCV				Total	P Value
	Lowest through 70	70-85	85-95	Highest through 95		
Hypochromia	3(1.8%)	45(27.1%)	0(0.0%)	0(0.0%)	48(28.9%)	0.000
Hypochromia, iron deficiency anemia	4(2.4%)	12(7.2%)	0(0.0%)	0(0.0%)	16(9.6%)	
Hypochromia and Hyperchromia	20(12.0%)	26(15.7%)	0(0.0%)	0(0.0%)	46(27.7%)	
Hypochromia with Macrocytosis	0(0.0%)	0(0.0%)	11(6.6%)	5(3.0%)	16(9.6%)	
Hyperchromia with Macrocytosis	0(0.0%)	0(0.0%)	6(3.6%)	1(0.6%)	7(4.2%)	
Hypochromia with Normocytic	0(0.0%)	6(3.6%)	12(7.2%)	7(4.2%)	25(15.1%)	
Hypochromia with both Microcytic and Macrocytic	0(0.0%)	8(4.8%)	0(0.0%)	0(0.0%)	8(4.8%)	

Table 7: shows the association of RDW with different anemic condition

Diagnosis of diseases	Modified RDW				Total	P Value
	11-14	14-16	16-20	Highest through 20		
Hypochromia	7(4.2%)	24(14.5%)	17(10.2%)	0(0.0%)	48(28.9%)	0.000
Hypochromia, iron deficiency anemia	0(0.0%)	0(0.0%)	3(1.8%)	13(7.8%)	16(9.6%)	
Hypochromia and Hyperchromia	0(0.0%)	9(5.4%)	19(11.4%)	18(10.8%)	46(27.7%)	
Hypochromia with Macrocytosis	0(0.0%)	2(1.2%)	6(3.6%)	8(4.8%)	16(9.6%)	
Hyperchromia with Macrocytosis	0(0.0%)	1(0.6%)	6(3.6%)	0(0.0%)	7(4.2%)	
Hypochromia with Normocytic	1(0.6%)	2(1.2%)	10(6.0%)	12(7.2%)	25(15.1%)	
Hypochromia with both Microcytic and Macrocytic	0(0.0%)	3(1.8%)	5(3.0%)	0(0.0%)	8(4.8%)	

DISCUSSION

According to NFHS-(III) report, 55% Indian women have anemia in which 39% with mild, 15% moderate, and 2% with severe anemia. Globally, more than 1.62 billion people has affected with anemia, which contributes around 24.8% of the world population. The highest prevalence of anemia is in preschool age children [10]. Anemia is more common condition these days due to busy and modern life-style. Habitually, people skip breakfast or lunch and these habits slowly lead to the development of nutritional anemia. The most common types of anemia are microcytic hypochromic anemia (63%) followed by normocytic normochromic anemia (24%), normocytic hypochromic anemia (9%), and dimorphic anemia [11]. Microcytic hypochromic anemia is more common in male (59%) as compared to females (41%) observed in Kerala [11] which observed higher than the current study. In another study, microcytic hypochromic anemia was found 50.47%, normocytic normochromic anemia 47.32%, dimorphic anemia 6.57%, hemolytic anemia 4.04%, macrocytic anemia 3.93 %, pancytopenia 1.06 %, and sickle cell anemia in 0.79 % in which 66.74% were females and 33.25% were males found in a scientific study in Rajkot, Gujarat [12] which was higher than our study. Another scientific study showed that microcytic hypochromic 86 %, dimorphic 9.1 % and, macrocytic 4.9 % in which Females were 61.2 % and Males were 38.8 % found on one scientific study in Tirupati, Andra Pradesh [13] which was higher than the current study. One research study, on the anemia in pregnant women and found that the microcytic hypochromic anemia 51 %, normocytic normochromic anemia 32 %, dimorphic anemia 13 %, macrocytic anemia 4 % in western Rajasthan [14] observed higher than Gurugram, Haryana. One of the studies showed that the normocytic normochromic 75.3%, microcytic hypochromic 24.0% and macrocytic anemia 0.7% in Saudi Arabia [15]. Overall, the prevalence of morphologically different types of anemia in Gurugram, Haryana is lower than other areas. The others various scientific studies have been observed that anemia is conditions which are associated with many health conditions like diabetes, cardiovascular, retinopathy, renal, and others [16].

CONCLUSION

Nutritional deficiency anemia is common in people and has become a major health problem in India. To eliminate it, certain major steps can be taken at people and society level. Such as life style, education, economical conditions and availability of foods are crucial factors of the people which are responsible for anemia, and these are notable causes and health problems. Imparting nutritional education, with special emphasis on strategies based on locally available foodstuffs to enhance the quality of food intake of vitamins, proteins, and iron, intake of appropriate iron supplements and ensuring maximum conformity, deworming, treatment of chronic illness like parasitic diseases, malaria, and others diseases. Long-term policies by non-government, government agencies and the society can be instructed to excogitate efficient plans like eliminating anemia in the individual.

AUTHOR CONTRIBUTION

All authors have equally & sufficiently participated in the work to take public responsibility for the content, including concept, design, analysis, writing, or revision of the manuscript.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ACKNOWLEDGEMENT

The authors are grateful to the staff and administration of the Sunrise Hospital, Gurugram for their kind support in the shaping of the work. All over the authors are highly grateful to the participants who participated in the study by providing the sample. The authors are thankful to all the participating people for their cooperation.

REFERENCES

1. Vos T, Flaxman AD, Naghavi M, Lozano R, Michaud C, Ezzati M, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet. 2012.
2. Nayak R, Rai S. Rapid Review of Hematology. 1st ed. New Delhi: Jaype Brothers Medical Pub. 2014.
3. Jadhav SU, Khaparde S. Study of the red cell indices, hemogram and platelet variations in anaemic (<10 gm %) patients by automatic cell counter in a tertiary care centre, Ahmednagar, Maharashtra, India. Int J Res Pharm Biomed Sci 2017; 28; 5(4):1582-8.
4. Demaeyer EM. Preventing and Controlling Iron Deficiency Anemia through Primary Health Care. Geneva, World Health Organization, 1998-99.
5. WHO. The prevalence of anemia in women: A tabulation of available information. 2nd ed. Geneva. WHO 1992.
6. Zhang X, He Y, Xie X, Ji M, Ma X, Yu Z. Distribution of hemoglobin and prevalence of anemia in 10 ethnic minorities in China :A population-based, cross-sectional study, Medicine 2017; 96(50): 1-6.
7. MOHP Nepal, New ERA and Macro International Inc. Nepal Demographic and Health Survey 2006. Kathmandu, Nepal 2007.
8. Baral KP. Iron deficiency anemia: a public health nutrition problem in Nepal Implication in Policy and Program. J Nepal Paediatr Soc 2003; 22:29-41.
9. Kanodia P, Bhatta M, Singh RR, Bhatta NK, Shah GS. A study of anemia among adolescent girls in eastern part of Nepal. JCMS Nepal 2016; 12 (1):19-22.
10. Kandasamy K, Prasad A, Surendran A, Sebastian AC, Rajagopal SS, Ramanathan S. Epidemiological study of prevalence of anemia and associated risk factors in a rural community; A home-based screening, Asian J Pharm Clin Res 2017; 10(2):307-309.
11. Suba G, Shradha Ambekar and H.T. Jayaprakash, Anemia in children - A hospital based study. IntJ Curr Res Aca Rev 2015; 3(7): 307-311
12. Gamit MJ, Talwelkar HS. Survey of different types of anemia. Int J Med Sci Public Health 2017; 6(3):493-496.
13. Babu UP, Prasad BVS, Reddy ES and Manasa RV. A Cross Sectional Study on Morphological Pattern of Anemia. IOSR 2016; 15(8):68-71.
14. Rawat K, Rawat N, Mathur N, Mathur M, Chauhan N, Kakkar R, et al. Prevalence and pattern of anemia in the second and third trimester pregnancy in Western Rajasthan. Int J Res Med Sci 2016; 4:4797-9.
15. Elsayid M, Al-Qahtani AM, Alanazi A, Qureshi S. Determination of the most common morphological patterns of anemia among Saudi anemic patients attending King Abdul-aziz Medical City-Riyadh. Int. J. Med. Public Health 2015; 5:301-4.
16. Rajagopal L, Ganesan V, Abdullah Sm, Arunachalam S, Kathamuthu K, Ramraj B, Exploring The interrelationship between electrolytes, anemia, and glycosylated hemoglobin (Hba1c) levels in type 2 diabetics , Asian J Pharm Clin Res 2018;11(1):251-256.