Original Research Article

Indian Journal of Pathology: Research and Practice
Volume 6 Number 4, October - December 2017 (Part-II)
DOI: http://dx.doi.org/10.21088/ijprp.2278.148X.6417.46

Study of Morphological Patterns and Prevalence of Anemia: A Study from a Teaching Hospital in Rural Telangana

Srinivas N.S. Nori*, Vijaya Lakshmi, Ramana Kumar*****

*Assistant Professor **Associate Professor ***Professor, Department of Pathology, RVM Institute of Medical Sciences and Research Centre, Laxmakkapally, Mulugu Mandal, Siddipet District, Telangana 502279, India.

Abstract

Introduction: Anemia is major public health problem. Diagnosis of anemia and its correction needs crucial intervention. Peripheral blood smear examination plays an important role in classifying anemais based on morphology of RBCs. Nutritional deficiency is a major risk factor for anemias. *Aim of the study:* The aimof the study is to look at the morphological patterns and prevalence of anemias in a teaching hospital in rural Telangana. *Materials and Methods:* It is a hospital based observational study done in the department of Pathology at RVM Institute of Medical Sciences and Research Center, Siddipet district, Telangana State for a period of two months from August 2017 to September 2017. A total of 560 cases attending a rural medical camp were screened for anemia. All the cases were sent to department of Pathology (central laboratory) for routine investigations for anemia. Investigations advised were - Hemoglobin estimation, complete Hemogram, Peripheral smear examination and Reticulocyte count. *Observations and Results:* In the present study all the 560 cases were screened for anemia. 230 (41%) cases were normal and 330 (59%) cases showedanemia.157/330 cases were among 21-30 years followed by 31-40 years 62/330 cases. Female preponderancewas seen 339/560 (60.5%) compared to males 2 21/560 (39.4%). Clinically about 53.5 % cases presented with pallor. Among 560 cases screened, about 330 (59 %) cases showed features suggestive ofanemia.Microcytic hypochromic anemia was observed commonly among 55.3% cases (310/560) and normocytic normochromic in 230 cases (41%). *Conclusion*: Microcytic hypochromic anemia was the most common type of anemia identified. Females were commonly affected than males.

Keywords: Anemia Prevalence; Iron Deficiency; Microcytic Hypochromic Anemia; Medical Camp Study.

Introduction

Anaemia has a significant public health burden in developing nations [1,2].

Anaemia is not a diagnosis. It occurs secondary to an underlying disease process. Anaemia defines a state in which an individual's haemoglobin concentration (red cell mass) falls two standard deviations below the reference intervals in a particular population (individuals of similar age, gender and geographical location) [3,4]. Various epidemiologic studies both locally and in other developing nations have highlighted the burden, distribution and risk factors of anemia. According to WHO estimates, more than a third of the world population (2 billion) is affected by anemia [1,2]. In other words, the definition of anemiadepends on many variables such as biologic age, gender, race, and altitude above sea level, pregnancy, smoking status and other factors [5].

According to the World Health Organization (WHO), there are two billion people with anaemia in the world and half of the anaemia is due to iron deficiency [6]. Anaemia is a late indicator of iron deficiency, so it is estimated that the prevalence of iron deficiency is 2.5 times that of anaemia [6,7].

Aim of the Study

To study the morphological patterns and prevalence of anemia in cases from a teaching hospital in rural Telangana.

Corresponding Author: Srinivas N.S. Nori, Assistant Professor, Department of Pathology, RVM Institute of Medical Sciences and Research Centre, Laxmakkapally, Mulugu Mandal, Siddipet District, Telangana 502279, India.
E-mail: drsrinivasnns@gmail.com

(Received on 16.10.2017, **Accepted on** 30.10.2017)

The objectives are

1. To classify anemias based on morphology on peripheral blood smears.
2. To study clinical and hematological profile of anemia.
3. To identify the etiological factors for anemia.

Materials and Methods

Ethical permission was taken from the institute. This was a hospital based observational study conducted in the department of Pathology at RVM Institute of Medical Sciences and Research Centre, Siddipet District, Telangana State over a period oftwo months from August 2017 to September 2017.

A total of 560 caseswere screened and studied in a medical camp conducted at RVM Institute of Medical Sciences and Research Center during this period.

Thorough clinical history was taken from all the cases who attended the Medical camp, including occupational, personal, dietary history, any addictions and socio-economic status of the subjects. Complete general physical and systemic examination was done and patients were checked for pallor, icterus, koilonychia, lymphadenopathy, pedal edema and any organomegaly.

All the 560 cases were sent to department of Pathology (central laboratory) for routine investigations. Investigations included were - Hemoglobin estimation, complete hemogram, peripheral smear examination and reticulocyte count in all the cases. Additional tests done were as required according to clinical indications such as stool for occult blood, urine analysis, sickling tests, serum electrophoresis etc.

Venous blood was collected under all aseptic conditions from the anterior cubital vein from all the patients. The anticoagulant used was EDTA.

Peripheral smears were taken from all the patients and were stained by Leishman's stain. Morphology of RBC, WBC and platelets was studied. Automated Hematologyanalyzer *(Horiba 3 part analyzer)* was used. RBC, WBC and platelet parameters were cross checked with the above data. PCV, MCV, MCH, MCHC and RDW were determined by automated cell counter. Normal values were taken as follows: PCV 35-45%, MCV 77-95fl, MCH 25-33pg, MCHC 31-37gm/dl and RDW 14.5-18.5.

Anemia was classified morphologically based on peripheral smear findings and classified as microcytic hypochromic anemia, macrocytic anemia, dimorphic anemia, normocytic normochromic anemia and normocytic hypomochromic anemia.

Inclusion Criteria

1. All the cases attending Medical camp.
2. All the cases sent for routine investigations to the Pathology department.
3. Age group from one year to 80 years were included.

Exclusion Criteria

1. Indoor patients having signs and symptoms of anemiaand who were admitted for evaluation of anemia.
2. Pregnant women.
3. Known cases of anemia already on treatment.

Results and Observations

A total of 560 cases including both genders were screened in a Medical camp conducted at RVM Institute of Medical Sciences and Research Center, Telangana, for duration of two months ie, from August-September 2017.

In the present study, a total of 560 cases attended pathology lab and their age distribution varied fromnewborn to 80 years.

In the present study all the 560 cases were screened for presence of anemia. 230 (41%) cases were normal and 330 (58.9%) cases showed features of anemia.

Hence, the prevalence wascalculated as: Total number of cases with anemia x 100.

Total number of cases with anemiaie, 330/560 = 58.9%

Prevalence rate of anemia was 58.9 % in, Mulugu Mandal, Siddipet district, Telangana.

157/330 cases were among 21-30 years followed by 62/330 cases in the 31-40 years age group. Least age group was between 70 to 80 years (12/330). Also this age group had least number of patients.

In the present study, majority were female patients ie, 339/560 (60.5%) compared to males 221/560 (39.4%).

Symptoms

In the present study fever was seen in 11.6% of patients followed by weakness and fatigability in almost 40% of patients.

On General Examination

In the present study, 53.5 % cases presented with pallor ie, (300/560)cases.

In the present study of the 560 cases screened for anemia, 330 (59%) cases showed anemia. Severe anemia was seen in 33.9% cases (190/330). In females, anemia constituted about 57.2% cases (189/330). In males, anemiaconstituted about 42.7% cases (141/330).

In the Present Study Based on Peripheral Smear Examination

Microcytic hypochromic anemiawas observed commonly among 55.3% cases (310/560). Macrocytic anemiawas seen in 10 cases (1.7%). Dimorphic anemia and Normocytic hypochromic was seen in 5 (0.8%) cases each. Normocytic normochromic type anemia was seen in 230 cases (41%).

Among 330 cases of anemia studied based on peripheral smear findings such as anisopoikilocytosis, microcytes, macrocytes,ovalocytes, tear drop cells, pencil shaped cells, target cells, hypersegmented neutrophils and RBC indices. 290 cases showed decrease in MCV, MCH, MCHC values. Normal indices of MCV, MCH and MCHC were seen in 20 cases and increased MCV, MCH and normal MCHC values were seen in 20 cases. Hence, a diagnosis of iron deficiency was reported predominantly in cases 72.7% cases (290/330) followed by megaloblastic anemia in 20/330 (18.1%). Hemolyticanemiawas reported in 10 cases and Aplastic anemia in 10 cases. Confirmation of the above diagnosis should be done by special investigations such as serum iron, serum

Table 1: Age distribution of all the cases screened showing normal cases and thosewith anemia

Age (in years)	Normal cases	Cases with anemia	Total no. of cases
0-10	14	16	30
11-20	17	31	48
21-30	53	157	210
31-40	30	62	92
41-50	45	20	65
51-60	40	15	55
60-70	23	17	40
70-80	08	12	20
Total	230	330	560

Table 2: Gender distribution

Gender	No. of cases	Percentage (%)
Males	221	39.4%
Females	339	60.5 %
Total	560	100%

Table 3: Clinical signs and symptoms

Clinical signs and symptoms	No. of Cases	Percentage (%)
Pallor	300	53.5%
Fever	65	11.6%
Icterus	160	28.5%
Weakness and fatigability	220	39.2%
Cough	30	5.3 %
Splenomegaly	25	4.4%
Hepatomegaly	38	6.7%
Vomiting	35	6.2%
History of Pica	29	5.1%
Koilonychia	80	28.5 %

Table 4: Severity of anemiaaccording to hemoglobin

Grade of Anemia	Males	Females	Total	Percentage (%)
Normal (>12gm%)	80	150	230	41%
Mild (10-12 gm %)	35	30	65	11.6%
Moderate (7- 9 gm %)	30	45	75	13.3%
Severe (< 7 gm %)	76	114	190	33.9%
Total	221	339	560	100%

Table 5: Distribution ofanemia according to red blood cell morphology in peripheral smear

Morphology of RBC	No of patients	Percentage (%)
Microcytic Hypochromic	310	55.3%
Macrocytic	10	1.7%
Dimorphic	05	0.8%
Normocytic hypochromic	05	0.8%
Normocytic normochromic	230	41%
Total	560	100%

ferritin, serum vitamin B12 level, serum folic acid level and hemoglobin electrophoresis.

Discussion

Prevalence

In the present study, a total of 560 cases were studied, of which 330 cases were found to be anemic giving a prevalence of 59%. Babu et al [8] studied a total of 920 hemograms and found 685 patients to be anemic giving a prevalence of 74.5%. Joshi et al [9] studiedblood samples from1645 apparently normal people, and found anemiain 740 subjects giving a prevalence of 44.9%.

Gender Distribution

In the present study, in females, anemiawas found in about 57.2% cases (189/330). In males, anemia was seen in 42.7% cases (141/330).

In the study by Babu et al [8] females with anemia were 419 (61.2%) and males with anemiawere 266 (38.8%), and showed female preponderance with Male: Female ratio of 1:1.6. In the study by Joshi et al [9] out of 740 subjects, 314 were males and 426 were females.

In the study by Le et al [10] overall, the prevalence of anemia in non-pregnant females was significantly higher than that of males. Regarding severity, moderate to severe anemia was five times more common in non-pregnant females in comparison to males (2.5% versus 0.5%, $p<0.0001$).

Age Distribution

In the present study, age distribution varied from 0 -10 years to 80 years. Most commonly affected age group was 21-30 years, ie, 210/ 560 (37.5%) followed by 31-40 years ie, 92/ 560 (16.4 %). Least age group involved was 70 years to 80 years.ie, 09/560 (3.5%). In Babu et al [8] study, female patients, most of them presented mainly between 21-30 years followed by 41-50 years, with shared percentage of 23 and 10.8%. In males, most of cases presented at the age group of 51-60 years followed by >60 years with shared percentage of 13.6, and 5.2%. In the study by Le et al [10] anemia was more common in the age group of 20-40 years (28.82%) as compared to younger, <20 years (3.95%) and older age group 40-60 years, (12.16%). Kumari et al [11] showed prevalence of anemia in general population to be 43.21% in which maximum cases belonged to 0-20 year age group.

Severity of Anemia

In the present studyof the 560 cases on hemogram study, 330 (59%) cases showed anemia. In females, anemiawas seen in 57.2% cases (189/330). In males, anemia constituted about 42.7% cases (141/330). In the study by Le et al [10] according to severity, mild anemia was present in 79.5% of subjects in which 33.6% were male and 45.85% were female. Moderate anemia was present in 16% in which 6.89% were male and 9.11% were female. In our study, severe anemia was present in total 4.5% cases with 1.89% male and 2.61% female patients.

Table 5: Comparative study showing distribution anemia according to red cell morphology on peripheral smear examination

Morphology of RBC	Elsayid et al [12]	Present study
Microcytic hypochromic	36	310
Macrocytic	01	10
Dimorphic	-	05
Normocytic normochromic	113	230
Normocytic hypochromic	-	05
Total	150	560

Peripheral Smear Examination

In our study, microcytic hypochromic anemia was observed among 55.3% cases (310/560), macrocytic anemia in10 cases (1.7%), dimorphic anemia and normocytic hypochromic was seen in each 05 cases (0.8%) and normocytic normochromic type was seen in 230 cases (41 %).

Elsayid et al [12] observedin their studythat based on gender wise classification the patterns revealed that 62 (55%) of male patients had normocytic normochromic patterns, while 51 (45%) female patients and 7 (19%) males patients had microcytic hypochromic patterns. The macrocytic type anemia was seen in 29 (81%) females and only in one case of a males patient.

Babu et al reported the commonest pattern of anemia as microcytic hypochromic followed by dimorphic type followed by macrocytic anemia. Our findings of observing microcytic hypochromic as the most common type of anemia compare well the findings of Babu et al [8].

Leet al [10] aslo observed the most common type as microcytic hypochromic type (55.53%) followed by normocytic normochromic anemia. Our observations are similar to this study.

Conclusion

In the present study, microcytic hypochromicanemia was the most common type of anemiaobserved in cases attending medical campsin rural area suggesting that iron deficiency is the main cause of anaemia. However, special investigations are needed to confirm this cause. Microcytic hypochromic anemiais more common in females. The etiological factors for anemia in the present study could be due to nutritional deficiency and low socioeconomic status.

References

1. World Health Organization.Worldwide prevalence of anaemia 1993-2005. WHO, Geneva Report, 2008.
2. World Health Organisation. The prevalence of Anaemia in Women: A tabulation of Available information, Geneva 1992.
3. Wiwanitkit V. Introduction to tropical anemia. Nova Science Publishers, New York, 2007.p.1-17.
4. Adewoyin AS. Approach to anaemia diagnosis in developing countries: focus on aetiology and laboratory work-up. *International Blood Research and Reviews* 2015;4:1-13.
5. Sullivan KM, Mei Z, Grummer-Straw L, Parvanta I. Hemoglobin adjustments to define anemia. *Tropical Medicine and International Health* 2008;13:1267-71.
6. WHO, UNICEF, and UNU. Iron Deficiency Anaemia: Assessment, Prevention and Control: A Guide for Programme Managers, WHO, UNICEF, UNU, Geneva, Switzerland, 2001.
7. Zimmermann MB, Hurrell RF. Nutritional iron deficiency. *The Lancet* 2007;370:511–20.
8. Babu UP, Sai Prasad BV, Reddy S, Manasa RV. A Cross Sectional Study on Morphological Patterns of Anemia. *IOSR Journal of Dental and Medical Sciences* 2016;15(8):68-71.
9. Joshi P, Joseph D, Bajpai P, Manoria P, Joshi P, Yadav V, et al. Prevalence of anemia among the general population of Malwa (MP), India. *JEMDS* 2013;2(1): 46-51.
10. Le CHH. The Prevalence of Anemia and Moderate-Severe Anemia in the US Population (NHANES 2003-2012). *PLOS ONE* 2016;11(11):1-14.
11. Kumari S, Choudhary AK, Negi G., Prevalence of anemia among the general population of Bihar, India. *Ind Med Gaz* 2009;11:418-21.
12. Elsayid M, Mesfer A, Al-Qahtani, Alanazi A, Qureshi S. Determination of the most common morphological patterns of anemia among Saudi anemic patients attending KingAbdul-aziz Medical City-Riyadh. *International Journal of Medicine and Public Health* 2015;5(4):302-04.