



## Study of Morphological Pattern of Anemia at a Tertiary Care Centre Garhwal region of Uttarakhand

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### Abstract

According to WHO, anemia is defined as a condition in which the number of red blood cells or hemoglobin concentration within them is lower than normal. Haemoglobin is required to transport oxygen and if there are lesser number or abnormal red blood cells(RBCs) or not enough hemoglobin, there is reduced capacity of the blood to carry oxygen to the body's tissues. Most common types of anemias are microcytic hypochromic anemia, macrocytic anemia, dimorphic anemia, and normocytic normochromic anemia. The peripheral smear is highly sensitive for decreased RBC production. Examination of peripheral film provides a differential diagnosis that indicates which further tests are most appropriate. Blood smear has the advantage of speed which is clinically important in diagnosing severe anemia. Learning and gaining familiarities with different types and morphologies of damaged red blood cells may aid in the early diagnosis and treatment of anemia. In this study we aim to determine the most common morphological types of anemia in Srinagar, Uttarakhand

**Keywords:** Anemia, morphological pattern, microcytic, macrocytic, normocytic, hypochromia

### Introduction

Anemia is the most common health problem worldwide affecting all age groups in developing and developed countries. In India prevalence of anemia is 70% to 80% in children, 70% in pregnant women, and 24% in adult men (1).

Anemia is a medical condition in which hemoglobin concentration or Red cell number is below normal range for that age and sex. According to WHO hemoglobin level below 12gm/dl in female and below 13gm /dl in male are anemic. The most common causes of anemia is nutritional deficiencies, parasitic infections, blood loss, bone marrow suppression, bone marrow replacement and hemoglobinopathies (2,3). In India and other

developing countries, nutritional anaemia among pregnant woman ranges from 33% to 89% and is more than 60% in adolescent girls. National family health survey – 3 (NFHS)[4] 2005-06, ministry of health and family welfare govt. of India conducted series of survey based on a sample of households that are representative at national and state level. Prevalence of nutritional anemia among pregnant women in developed countries is 10% to 20 %.(5)

Anemia is most common presenting feature of many underlying diseases. Hence anemic patient evaluation is done to find out the cause of anemia, which include cause of reduce RBC count and morphological changes in RBC. A morphological classification of

anemia based on red cell morphology is very important to reach the cause of anemia. Morphologically anemia is classified according to size of RBC into normocytic , microcytic and macrocytic. Microcytic anemia of Iron deficiency is the most common type of anemia worldwide. ( 6)

Anemia is diagnosed by two methods one is manually by examining morphology of RBC in peripheral blood smears. Red cell morphology include size, shape, concentration of hemoglobin (chromia) and presence of inclusion in RBC. Secondly by red cell indices, mean corpuscular volume (MCV), mean corpuscular hemoglobin( MCH), mean corpuscular hemoglobin concentration (MCHC) obtained by automated hematology analyzer(7).

**Material And Method**

The study was conducted in the department of pathology of government medical college of Srinagar in uttarakhand state. Study data were taken from department of pathology from 1st January 2019 to 31st December 2019. All anemic patients’ peripheral blood smear and complete blood count data of this duration were analyzed.

On the basis of RBC indices obtained from Complete blood count on automated hematology analyzer and PBS finding a morphological evaluation of anemia was done.

**Result**

Total 862 patients of anemia were received in pathology department.

**Table 1 Age distribution of patients of anemia**

Age of patient	No of patients	Percentage%
Below 20 years	144	17
21-30	360	42
31-40	182	21
41-50	22	03
51-60	90	10
61-70	52	06
Above 70	12	01
Total	862	100

**Table 2 Sex distribution of patients**

Sex	No. of patients	Percentage%
Female	597	69
Male	265	31
	862	100

**Table 3 Morphological patterns of anemia**

Type of anemia	No. of patients	Percentage%
Normocytic	241	28
Microcytic	468	54

Macrocytic	69	08
Dimorphic	84	10
Total	862	100

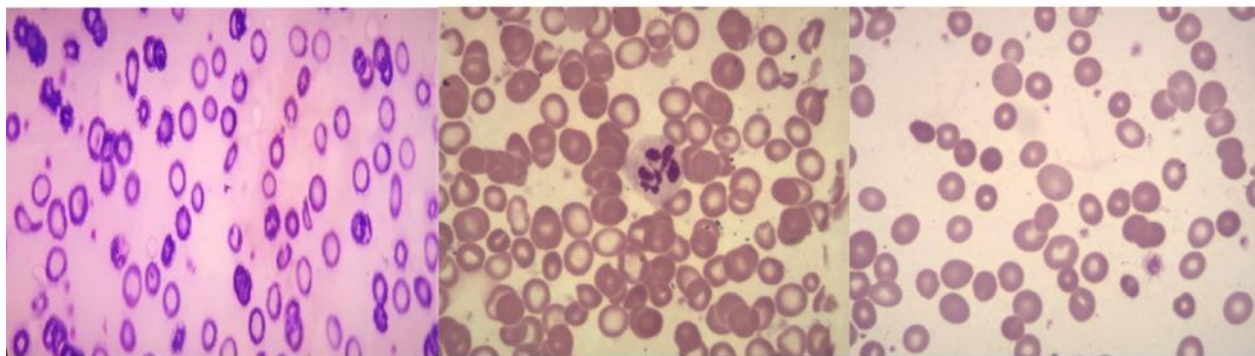
**Discussion**

Investigating a patient, type of anemia in clinical pathology is very helpful for the clinician to reach the final diagnosis of cause of anemia and hence helpful in treatment of patients. The morphological classification of anemia is done with the help of automated hematology cell counter and peripheral smear examination manually.

In this study we have analyzed complete blood count obtained from hematology analyzer and peripheral blood smear findings. In our study we found that females are more commonly affected (69%) by anemia than male (table 2) with the ratio male to female of 1:2.2. Similarly high percentage of anemia

in females was also reported by Garg et al and Singhal et al (8,9).

Microcytic hypochromic anemia [Fig 1(a)] was the commonest type of anemia in our study 54 % (table 3). Which was in accordance with Ahmed et al, Joshi et al & Choudhary et al. (10, 11, 12). Second most common anemia was normocytic normochromic anemia. Similar pattern was also reported by Mukaya et al in their study (13). In our study we found 10% dimorphic anemia patients. [Fig 1(c)] Similar percentage of dimorphic anemia was also reported by Babu et al (14). Percentage of macrocytic anemia was 8%. [Fig 1(d)]



**Fig 1 Photomicrograph of peripheral smear showing (a) Microcytic Hypochromic anemia (Leishman stain, 1000 X) (b) Macrocytic anemia (MGG, 1000 X) (c) Dimorphic anemia (MGG, 1000 X)**

In our study most common age group affected by anemia was 21-30, 41% (table 1), followed by 30-40, 21%(table). This may be correlated to increased nutritional need of both male and female in this age group. Among the female, microcytic anemia was more common, which commonly reflects iron deficiency. This is because of increased demand during pregnancy & menstrual blood loss. Along with these factor lack of iron absorption is also a major factor which result from dietary habit of people of this region of taking tea with meal. Tea contains caffeine which reduced iron absorption by 60 to 90 percent.

Normocytic normochromic anemia was high among the male patients. Etiology of this anemia is nutritional, blood loss & chronic disease like chronic renal disease (15). Dimorphic anemia was present in 10% of patients. Different morphological patterns of RBCs were present including microcytic, normocytic and macrocytic. These bimodal population of cells appears because of deficiency of iron & vit B12/ folic acid, iron deficiency anemia under treatment or macrocytic anemia under treatment.

Least common anemia in this study was macrocytic. Etiology of this anemia includes liver diseases alcoholism & vit B12 folic acid deficiency. Vit B12

folic acid deficiency can be nutritional resulting either from decreased intake or reduced absorption

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