

## A prospective study of morphological pattern of anaemia at a tertiary care centre

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### Abstract

**Introduction:** Anemia most often a sign of an acquired or genetic abnormality. It is one of the commonest manifestations of the underlying medical condition. Anemia functionally defined as an insufficient RBC mass to adequately deliver oxygen to peripheral tissues. Hemoglobin concentration estimation is the ideal and convenient way of detecting Anemia. **Materials and Methods:** A hospital based prospective observational study was carried out at Department of Pathology, Viswabharathi Medical College and General Hospital, R.T Nagar, Panchikalapadu, Kurnool from January 2020 to December 2020. 250 patients were evaluated for morphological pattern of anaemia based on red cell indices, peripheral smear, and leukocyte and platelet parameters. Anaemia was defined according to WHO criteria as haemoglobin concentration lower than 13 g/dL in men and 12 g/dL in women. Informed consent was obtained from patients. **Results:** The results of complete blood count (CBC) and peripheral blood picture (PBP) showed that 73 (29%), 137 (55%), and 40 (16%) of the patients had normocytic normochromic, microcytic hypochromic and macrocytic pattern of anaemia respectively. The gender wise classification of the patterns revealed that 44 male patients and 29 female patients had normocytic normochromic patterns, while 105 female patients and 33 male patients had microcytic hypochromic patterns whereas 22 males patients and 18 case of female patients showed macrocytic pattern. **Conclusion:** The microcytic hypochromic pattern of anaemia is highly frequent among this sample of patients while the macrocytic pattern of anaemia is the lowest. According to gender groups, microcytic hypochromic pattern of anaemia is more common among females; malnutrition, increase of blood loss due to pregnancy or menstruation, and lack of iron absorption are the main causes, while the normocytic normochromic anaemia is highly prevalent among males, which is mainly due to blood loss or chronic diseases.

**Key Words:** Anemia, CBC, PBP, WHO.

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### Introduction

Anemia most often a sign of an acquired or genetic abnormality. It is one of the commonest manifestations of the underlying medical condition. Anemia functionally defined as an insufficient RBC mass to adequately deliver oxygen to peripheral tissues[1]. Hemoglobin concentration estimation is the ideal and convenient way of detecting Anemia. Other measurements, which are also helpful are haematocrit and the RBC count. It is not enough to just report that patient has anemia, but also morphological sub typing of anemia is required, so that the clinician can be properly guided in the proper management and follow up of the anemic patient[2].

Anemia being the most common example of the health related problems faced by the Society, it is essential to diagnose anemia at the early stage. Education plays a very important role in the health of people. Females with high school education or more were found two times less anemic than those with lower education. Smoking and tobacco chewing persons had higher incidence than those with not. Even diet affects the severity of Anemia. Consumption of milk and green leafy vegetables in the women had shown, lesser severity of anemia than those without such nutrients[3].

Anemia is a condition of reduction in the haemoglobin (Hb) concentration of the peripheral blood below the normal level or the reduction in hematocrit below the lower limit of the 95% reference interval in relation to age and sex. It is not a disease but an expression or sign of an underlying disease. The World Health Organization (WHO) criteria for anemia in men are <13 gm/dl and women is < 12 gm/ dl[4].

Hb concentration estimation is the ideal and convenient way of detecting Anemia. Anemia is a common condition in the older population. Generally in individuals over 65 years, 8.5 % have a hemoglobin concentration meeting the WHO definition of Anemia. Prevalence of Anemia rises steadily with age, increasing from about 10 % in persons of 65 years and older, to about 20% in persons over 85 years[5]. Anemia is a significant predictor of morbidity, mortality and quality of life in the elderly, as a general risk factor or in the setting of other clinical conditions like heart failure. Iron deficiency Anemia is one of the silent killers in India and is one of the most important factors of maternal and fetal morbidity & mortality in India. There is also a strong association of males being involved in alcoholic consumption are more likely to develop anemia, which is macrocytic in nature[6]. The main causes of anemia are a decrease in RBCs, insufficient Hb synthesis or increased RBC's destruction and the primary cause is an iron deficiency. Anemia is the most common health issue in the World.

### Materials and methods

#### Study design

A hospital based prospective observational study.

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**Study location**

Department of Pathology, Viswabharathi Medical College and General Hospital, R.T Nagar, Penchikalapadu, Kurnool, Andhra Pradesh.

**Sample size**

250 patients were evaluated for morphological pattern of anaemia based on red cell indices, peripheral smear, and leukocyte and platelet parameters.

**Study Duration**

From January 2020 to December 2020 (1 year).

**Inclusion Criteria**

Patients fulfilling the WHO criteria of anaemia haemoglobin of less than 13 gm/dL in males and less than 12 gm/dL in females.

**Exclusion Criteria**

Patient who's Hb is less than 13 gm% but has received blood transfusion in the last 3 months. Patients on treatment with iron, folic acid, B12 supplements.

**Results****Table 1: Morphological Patterns of Anaemia among Study Participants**

S.No	Morphological Patterns of Anaemia	Frequency (%)
1	Normocytic normochromic	73 (29%)
2	Microcytic hypochromic	137 (55%)
3	Macrocytic anaemia	40 (16%)
4	Total	250

**Table 2: Frequency of Morphological Patterns among Study Participants with regard to Gender Groups**

S.No	Morphological Patterns of Anaemia	Males	Females	Total
1	Normocytic normochromic	44	28	72
2	Microcytic hypochromic	33	105	138
3	Macrocytic anaemia	23	18	40
4	Total	99	151	250

**Table 3: Other Significant Findings in Study Groups**

S.No	Finding	Frequency (%)
1	Pancytopenia	30 (12%)
2	Neutrophilia	25 (10%)
3	Lymphocytosis	25 (10%)
4	PMN Toxic granules	7 (3%)
5	immature cells	8 (3%)
6	Eosinophilia	4 (1%)

The results of complete blood count (CBC) and peripheral blood picture (PBP) showed that 73 (29%), 137 (55%), and 40 (16%) of the patients had normocytic normochromic, microcytic hypochromic and macrocytic pattern of anaemia respectively.

The gender wise classification of the patterns revealed that 44 male patients and 29 female patients had normocytic normochromic patterns, while 105 female patients and 33 male patients had microcytic hypochromic patterns whereas 22 males patients and 18 case of female patients showed macrocytic pattern.

Other significant findings seen in this study among patients of anaemia are: pancytopenia 30 (12%), neutrophilia 25 (10%), PMN toxic granules 8 (03%), eosinophilia 2 (01%), lymphocytosis 25 (10%), and immature cells 8 (03%). Patients having pancytopenia and immature cells further advised for bone marrow examination to rule out and diagnosis of aleukemic leukemia, subleukaemic leukemia, leukemia and other causes of anaemia. 8 (03%) cases of anaemia in this study had already diagnosed leukemia.

**Discussion**

In India, about two billion people suffer from anaemia. Being one of the developing countries, people of varied economic status are seen in India and so the diseases arising out of that also are varied[7]. At one

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Microcytic anaemia was defined as MCV below 80 fl, normocytic as MCV between 80 and 100 fl and macrocytic anaemia by an MCV above 100 fl. Dimorphic anaemia was defined with a normal MCV but a raised RDW (normal -11-15%). All were correlated with Peripheral smear examination.

The data was collected and analysed using standard statistical chi square test,  $p < 0.05$  statistically significant. Data was entered in Microsoft excel and analysis was done using SPSS version 22.

of end of spectrum, we have started facing 21st century emerging problems like obesity and metabolic syndrome in urban population and at other end, we are still struggling with nutritional deficiency leading to anaemia in rural population which are malnourished people. Apart from nutritional deficiency, acute and chronic blood loss, destruction of red blood cells, dyserythropoiesis, inflammatory conditions and systemic disorders are also some of the uncommon causes of anaemia[8].

The most common morphological type of anaemia was microcytic hypochromic anaemia (137) [55%], which was in accordance with Joshi et al. (55.53%) and Ahmed et al. (56.6%). In a study done by M. Bukar et al 2009, Microcytic hypochromic anaemia was the commonest pattern with 64.9% followed by Dimorphic anaemia with 34.7% and Macrocytic anaemia with 0.4%[9].

Our study showed that the Microcytic hypochromic pattern of anaemia was more frequent than the macrocytic pattern. The gender wise classification of the patterns revealed a microcytic hypochromic pattern of anaemia was more common among females. Malnutrition, an increase of blood loss due to pregnancy or menstruation, and lack of iron absorption are the main causes. In male patients, the frequency of the normocytic normochromic pattern of anaemia was high, which may be mainly due to blood loss or chronic diseases. In normocytic

anaemia, the important issue is to identify the main cause and to prescribe the right treatment. The aetiologies of normocytic normochromic anaemia are nutritional, renal diseases (e.g., renal failure) and increased red cell destruction. In macrocytic anaemia, the main causes are a low level of Vitamin B12 and a low level of erythrocyte folate. The estimation of both patterns of anaemia will guide the proper diagnosis of macrocytic anaemia[10].

The most common cause of folate deficiency is either nutritional or malabsorption of this vitamin. In contrast, the deficiency of Vitamin B12 is almost resulting from malabsorption.

### Conclusion

In our study, adolescent women were found to have high prevalence of anaemia. Since anaemia is more prevalent among low socio-economic groups, higher diagnostic tests lead to financial burden to the patients. The study of basic blood parameters and peripheral smear examination are less expensive and mandatory in the work up of anaemia.

Morphological patterns of anaemia reflect the underlying aetiology, the study of which would ensure benefits in the early detection and appropriate treatment. Iron deficiency anaemia being a nutritional anaemia, can be prevented by improving nutritional status, creating awareness, and educating people.

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