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Morphological pattern of anaemia in adults-A retrospective study

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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. 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[1]. **Materials and Methods:** A hospital based retrospective study was carried out at Department of Pathology, Tagore Medical College and hospital, chennai from April 2020 to March 2021. 200 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. Elderly was defined as a person 60 years and above according to WHO criteria. **Results:** The results of CBC and PBP showed that 58 (29%), 110 (55%), and 32 (16%) of the patients had normocytic normochromic, microcytic hypochromic and macrocytic pattern of anaemia respectively [Table 1]. The gender wise classification of the patterns revealed that 36 male patients and 28 female patients had normocytic normochromic patterns, while 104 female patients and 26 male patients had microcytic hypochromic patterns whereas 18 males patients and 14 cases of female patients showed macrocytic pattern [Table 2]. **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, WHO criteria, NFHS-3, CBC, PBP.

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. 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[1]. 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[2].

Anemia is not a diagnosis itself, but it is a sign of underlying disease. Hence the evaluation of a patient with anemia is directed at elucidating the causes for the patient's reduced number and morphological changes of red blood cells. An initial morphological classification of anemia with integration of red blood cell indices and morphological characteristics is probably most useful.

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The classification of anemia is also very important for the appropriate treatment of the underlying disease. Hence anemia is categorised by RBC size as microcytic, normocytic, or macrocytic.

Microcytic anemia associated with iron deficiency is the most prevalent micronutrient deficiency disease in the world affecting 2 billion people.⁴ Anemia is diagnosed either by manual method ie peripheral blood smear examination or by automated hematology analyzer. The microscopic examination of a peripheral blood smear provides a wealth of information to the clinician. Various forms of anemia may actually be diagnosed from abnormal red cell morphology reported on a blood smear examination. The red cell morphology evaluation should include examination for deviation in size, shape, distribution, concentration of haemoglobin, colour and the appearance of inclusions.⁵

Materials and methods

A hospital based retrospective study was carried out at Department of Pathology, Tagore Medical College and hospital, chennai from April 2020 to March 2021. 200 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. Elderly was defined as a person 60 years and above according to WHO criteria. Anaemia was further graded into Mild, Moderate and Severe according to WHO criteria as under-

Mild	11-12.9 g/dL (Men) 11-11.9 g/dL (women)
Moderate	8-10.9 g/dL
Severe	< 8 g/dL

Microcytic anaemia was defined as MCV below 80 fl, normocytic as MCV between 80 and 100 fl and macrocytic anaemia by an MCV

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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.

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.

Statistical Analysis
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.

Results
The results of CBC and PBP showed that 58 (29%), 110 (55%), and 32 (16%) of the patients had normocytic normochromic, microcytic hypochromic and macrocytic pattern of anaemia respectively [Table 1]. The gender wise classification of the patterns revealed that 36 male patients and 28 female patients had normocytic normochromic patterns, while 104 female patients and 26 male patients had microcytic hypochromic patterns whereas 18 males patients and 14 cases of female patients showed macrocytic pattern [Table 2].

Other significant findings seen in this study among patients of anaemia are: pancytopenia 24 (12%), neutrophilia 20 (10%), PMN toxic granules 06 (03%), eosinophilia 02 (01%), lymphocytosis 20 (10%), and immature cells 06 (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. 06 (03%) cases of anaemia in this study had already diagnosed leukemia.

Table 1: Frequency of Morphological Patterns of Anaemia among Study Participants

Morphological Patterns of Anaemia	Frequency (%)
Normocytic normochromic	58 (29%)
Microcytic hypochromic	110 (55%)
Macrocytic anaemia	31 (16%)
Total	200

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

Morphological Patterns of Anaemia	Males	Females	Total
Normocytic normochromic	36	24	60
Microcytic hypochromic	26	84	110
Macrocytic anaemia	18	14	32

Table 3: Other Significant Findings in Study Groups

Pancytopenia	24 (12%)
Neutrophilia	20 (10%)
Lymphocytosis	20 (10%)
PMN Toxic granules	06(03%)
immature cells	06(03%)
eosinophilia	02(01%)

Discussion
The most common morphological type of anaemia was microcytic hypochromic anaemia (110 [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%[6]. 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[7,8]. 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[9,10]. 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.

Iron deficiency anaemia is the most common type of anaemia seen mainly in women in the reproductive age group. 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.

Conclusion

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