

A STUDY OF MORPHOLOGICAL TYPES OF ANAEMIA IN A TERTIARY CARE HOSPITAL - A TWO-YEAR STUDY

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ABSTRACT

BACKGROUND

In this tertiary care hospital, one of the common condition of all the patients attending the hospital is Anaemia, which is a decrease in haemoglobin content or decrease in haematocrit below the lower limit of the 95% reference range for the individual's age and sex. The patient presents with varied symptoms of different grades, depending on the severity of anaemia, in different clinical settings. Common presenting symptoms of anaemia are generalised weakness, malaise, loss of appetite and muscular pains.

METHODS

All the patient samples received at the central laboratory for haemogram, complete blood counts and peripheral smear examination over the period of two years between June 2014 to May 2016 were included in the study. Anaemia cases were diagnosed depending on the criteria of the definition of anaemia, and morphological typing of anaemia was done based on the peripheral smear examination of all the cases with decreased haemoglobin level. Standard cell counter was used to estimate the Hb and other red cell indices, and corroborated with peripheral blood smear examination by standard Romanowsky stains.

RESULTS

A total of 810 cases of anaemia were diagnosed over the period of two years, of which morphological typing yielded 685 cases of Microcytic and hypochromic anaemia, 15 cases of Dimorphic anaemia, 22 cases of Macrocytic anaemia and 88 cases of Normocytic and normochromic anaemia.

CONCLUSION

Anaemia is one of the most common problems of patients attending this tertiary care hospital, and detection and morphological typing of anaemia is very helping in guiding the clinicians in diagnosis and further management of anaemias for better patient care.

KEYWORDS

Anaemia, Microcytic, Normocytic, Macrocytic.

HOW TO CITE THIS ARTICLE: Epari KK, Shajauddin M, Ramalaxmi PVB. A study of morphological types of anaemia in a tertiary care hospital - A two-year study. *J. Evid. Based Med. Healthc.* 2016; 3(65), 3524-3527. DOI: 10.18410/jebmh/2016/756

INTRODUCTION: Anaemia is most often a sign of an acquired or genetic abnormality. It is one of the commonest manifestations of the underlying medical condition. Anaemia is functionally defined as an insufficient RBC mass to adequately deliver oxygen to peripheral tissues. Hb concentration estimation is the ideal and convenient way of detecting anaemia. Other measurements which are also helpful are haematocrit and the RBC count.¹ It is not enough to just report that patient has anaemia, but also morphological subtyping of anaemia is required, so that the clinician can be properly guided in the proper management and followup of the patient and to suggest further

haematological investigations for knowing the specific cause of anaemia. Morphologically, in peripheral blood smear examination, Anaemia can be microcytic hypochromic type, macrocytic type, dimorphic type and normocytic and normochromic type. Each of these morphological types has varied aetiologies and can be known by correlating with patient's clinical history, clinical examination and by further suitable investigations. This helps the clinicians to know the common types and causes of anaemia in the community, which helps in taking appropriate measures to prevent the anaemia.

AIM OF THE STUDY: The aim of this study is to know the prevalence and incidence of anaemia in the community and to know the various morphological types of anaemia, to know the causes and guide the clinicians in planning for the management of anaemic patients.

Financial or Other, Competing Interest: None.
Submission 15-07-2016, Peer Review 25-07-2016,
Acceptance 06-08-2016, Published 12-08-2016.
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DOI: 10.18410/jebmh/2016/756

MATERIALS AND METHODS: All the blood samples of the outpatients and inpatients received at central laboratory of this tertiary care hospital, for haemogram, complete blood counts and peripheral blood smear examination were examined, and the number of cases having anaemia was detected using standard cell counter. Morphological subtyping of these anaemic patients was done by peripheral blood smear examination by using standard Romanowsky stains. Anaemia was diagnosed basing on the normal reference ranges according to the sex and age of the patients. Hb levels along with PCV, MCV, MCH and MCHC were obtained in the standard automated cell counter and were correlated with peripheral blood smear examination of the blood samples for more accuracy. Normocytic and normochromic anaemia is designated when Hb levels were reduced but smear shows mostly normocytic and normochromic red cells with normal red cell indices obtained in the automated cell counter. Microcytic and hypochromic anaemia is designated when Hb is reduced and peripheral smear shows mostly microcytic red cells, i.e. the size of red cells is less than the size of a small lymphocyte, with several degrees of hypochromasia, indicated by increased area of central pallor, along with presence of elliptocytes, pencil-shaped red cells and few tear drop cells in some cases. These findings were correlated with Hb values and red cell indices obtained in cell counter. Macrocytic anaemia is designated when the peripheral smear shows macrocytes and macro-ovalocytes, which are larger than the small lymphocyte and macro-ovalocytes not exhibiting the central pallor. There are also hypersegmented neutrophils in macrocytic anaemia. These findings are correlated with high values of red cell indices obtained in cell counter. Dimorphic anaemia is designated when there is mixed presence of both populations of red cells, either of microcytic, normocytic or macrocytic in the peripheral smear.

RESULTS: A total of 810 cases of anaemia were diagnosed over the period of two years, on the basis of automated haematology cell counter values and correlation with peripheral blood smear examination, of which morphological typing yielded 685 cases of Microcytic and hypochromic anaemia, 88 cases of Normocytic and normochromic anaemia, 22 cases of Macrocytic anaemia and 15 cases of Dimorphic anaemia.

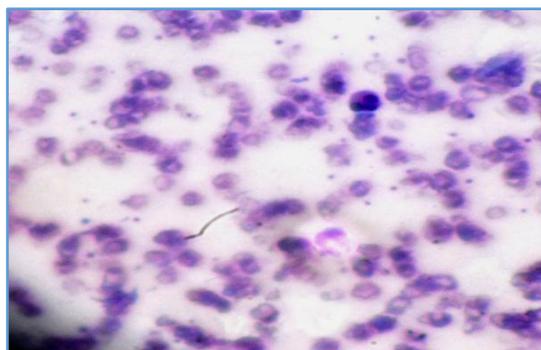


Fig. 1: Peripheral Blood Smear Picture showing Microcytic Hypochromic Anaemia (Leishman's Stain X 400)

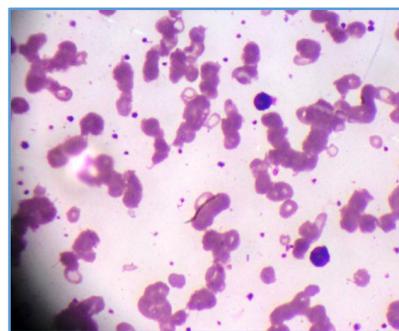


Fig. 2: Peripheral Blood Smear Picture showing Dimorphic Anaemia (Leishman's Stain X 400)



Fig. 3: Peripheral Blood Smear Picture showing Macrocytic Anaemia with Hypersegmented Neutrophil (Leishman's Stain X400)



Fig. 4: Peripheral Blood Smear Picture showing Normocytic and Normochromic Anaemia (Leishman's Stain X400)

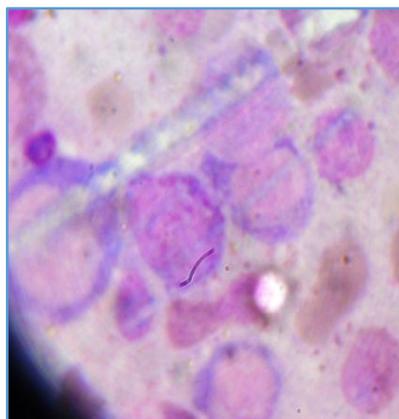


Fig. 5: Bone Marrow Aspiration Smear Picture showing Megaloblasts in Megaloblastic Anaemia (Leishman's stain X1000)

Types of Anaemia	Prevalence (No. of cases and percentage)
Microcytic hypochromic	685(85%)
Normocytic normochromic	88(10%)
Macrocytic	22(03%)
Dimorphic	15(02%)

Table 1: Distribution of Number of Cases and Percentage of Morphological Types of Anaemia

Age (In years)	No. of anaemia cases
0-18	110
19-45	460
>45	240
Total	810

Table 2: Age-wise Distribution of Anaemia Cases

Age group	0-18 yrs.	19-45 yrs.	>45 yrs.
Microcytic hypochromic	93%	92%	81%
Dimorphic	03%	01%	02%
Macrocytic	02%	01%	05%
Normocytic & Normochromic	02%	06%	12%

Table 3: Age wise Percentage Distribution of types of Anaemia

DISCUSSION: Anaemia is one of the most common health related problems in the community. It is important to diagnose this condition at an early stage along with morphological typing, which helps to know the underlying cause of anaemia, by suggesting further appropriate investigations whenever necessary. WHO defines the lower limit of normal for Hb concentration in adults to be 12.0 g/dL in women and 13.0 g/dL in men². Anaemia is a common condition in the older population. Generally, in individuals over 65 years, 8.5% have a Hb concentration meeting the WHO definition of anaemia. Prevalence of anaemia rises steadily with age, increasing from about 10% in persons of 65 years and older, to about 20% in persons over 85 years. Anaemia 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.^{3,4} The lower limit of normal Hb concentration at birth is 14 g/dL and this decreases to 11 g/dL by 1 year of age. This is called physiological anaemia of infancy. It occurs as normal physiological adaptation from hypoxic intrauterine situation to well oxygenated extrauterine situation. Some causes of macrocytic anaemia are folic acid and Vit B12 deficiency, post-haemorrhagic anaemias, alcoholism, liver disease and hypothyroidism. Some causes of microcytic hypochromic anaemias are iron deficiency, anaemia of chronic disorders, thalassaemias and sideroblastic anaemias.^{5,6} Some causes of Normocytic and normochromic anaemias are post-haemorrhagic anaemias, haemolytic anaemias, anaemia of

renal insufficiency, anaemia of liver disease, anaemia of endocrine deficiency and anaemia of chronic disorders.^{7,8}

Some causes of dimorphic anaemias are combined iron and folate deficiency, following treatment of anaemics with haematinics, and following transfusion in microcytic or macrocytic anaemic patients. Microcytic hypochromic anaemia is the most common type of anaemia in this study. Females are more affected than the males. Females with proper education and economic status have lesser incidence than in uneducated and poorer economic strata.^{9,10} Women with habits of smoking and tobacco chewing have more incidences. Dietary factors also play an important role. Consumption of milk and green leafy vegetables in the women have lesser incidence and severity of anaemia. Prevalence of microcytic hypochromic anaemia is also higher in pregnancy, due to haemodilution and increased need of iron and folic acid during pregnancy.¹¹ Red cell indices like MCV (mean corpuscular volume), MCH (Mean corpuscular haemoglobin) and MCHC (Mean corpuscular haemoglobin concentration) provide important information to know the type of anaemia, in correlation with the peripheral smear examination. In this study, microcytic hypochromic anaemia is the most common type, followed by Normocytic, Macrocytic and Dimorphic types. Evaluation of the history and clinical examination findings were done in all the cases prior to peripheral blood smear examination.¹² Microcytic hypochromic anaemia patients were investigated for the levels of serum iron, serum ferritin and TIBC (Total iron binding capacity). It was found that nearly 85% of microcytic hypochromic anaemia patients have low levels of serum iron (normal 50-160 microgram/dL). Serum ferritin (normal 12-300 microgram/L) and TIBC (normal 250-400 microgram/dL) was found to be raised. In the patients with macrocytic anaemia, serum Vit B12 (normal 200-900 ng/L) estimations were done, which were found to be low in nearly 70% of cases.¹³ With these findings, it was concluded that nutritional deficiency is the most common cause of anaemia in this study. Patients with dimorphic anaemia, were found to be mostly of nutritional causes, with deficiency of iron, folic acid and Vit B12. Bone marrow studies were done in patients with macrocytic anaemias, to diagnose megaloblastic anaemias.¹⁴

CONCLUSION: Anaemia is one of the common health problems in the community across all the age groups. Females are more commonly affected than males, and more common especially in the reproductive age group. Each of the morphological types of anaemias have varied aetiology. With the help of complete blood counts, peripheral blood smear examination, clinical history and clinical examination, types of anaemia and the underlying causes can be known, along with further investigations wherever necessary. Most common cause of anaemia in the community is nutritional deficiency. Effective preventive health measures can help to overcome the commonest type of anaemia and the longstanding complications of untreated severe anaemias.

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