

Prevalence, Classification and Severity of Anemia Stratified by Age and Gender

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ABSTRACT: Anaemia is a major public health problem in India. The estimated prevalence of anaemia in developing countries is 39% in children <5 years, 48% in children 5–14 years, 42% in women 15–59 years, 30% in men 15–59 years, and 45% in adults >60 years. These staggering figures have important economic and health consequences for low- and middle-income countries. This study is conducted to determine the relationship of anemia with age of the people, gender and also to assess the severity of anemia among different age group. The prevalence and type of anemia were studied from a population of 4800 people and from that 48 patients were taken for the study. Present study showed that anemia was more prevalent among females (68%) than the males (32%). The common age group diagnosed with anemia among females is 40-60 years and among male patients anemia was mostly seen among elderly persons more than 60 years. The type of anemia common among females less than 60 years of age was microcytic hypochromia possibly iron deficiency anemia whereas in patients above 60 years the morphology was normocytic normochromic. Comparing the severity of anemia females mostly had mild grade anemia whereas males mostly had anemia of moderate grade.

KEYWORDS: Iron deficiency anemia, microcytic hypochromic, normocytic normochromic

I. INTRODUCTION

Anemia is defined as a lower than normal hemoglobin concentration. In order to make a generalized approach to the diagnosis of anemia, the World Health Organization (WHO) has established a reference range for normal blood hemoglobin concentration, depending on age and sex. According to this criterion, anemia is present if the blood concentration of hemoglobin falls below 130 g/L in men or 120 g/L in women. This rule does not apply to infants, children and pregnant

women, who have their own tables of lower limits of hemoglobin concentration.¹

It is a presentation of an underlying condition and the patients present with vague symptoms such as lethargy, weakness, and tiredness. Severe anemia may present with syncope, shortness of breath, and reduced exercise tolerance. Anemia is not a diagnosis, but a presentation of an underlying condition. Whether or not a patient becomes symptomatic depends on the etiology of anemia, the acuity of onset, and the presence of other comorbidities, especially the presence of cardiovascular disease. Most patients experience some symptoms related to anemia when the hemoglobin drops below 7.0 g/dL. Anemia is an extremely common disease affecting up to one-third of the global population. In many cases, it is mild and asymptomatic and requires no management.²

In the elderly, approximately one-third of patients have a nutritional deficiency as the cause of anemia, such as iron, folate, and vitamin B12 deficiency. In another one-third of patients, there is evidence of renal failure or chronic inflammation.³

Classically, mild iron-deficiency anemia is seen in women of childbearing age, usually due to poor dietary intake of iron and monthly loss with the menstrual cycles. Anemia is also common in elderly patients, often due to poor nutrition, especially of iron and folic acid. Other at-risk groups include alcoholics, the homeless population, and those experiencing neglect or abuse.

New-onset anemia, especially in those over 55 years of age, needs investigating and should be considered cancer until proven otherwise. This is especially true in men of any age who present with anemia.¹

Anemia can be classified from three points of view: pathogenesis, red cell morphology, and clinical presentation. All are important to guide the diagnosis. Pathogenic mechanisms involved in the production of anemia are very simple: inadequate production and loss of erythrocytes as a result of

bleeding or hemolysis. Based on these pathogenic mechanisms, anemia can be divided into two types. (1) Hypo-regenerative: when bone marrow production is decreased as a result of impaired function, decreased number of precursor cells, reduced bone marrow infiltration, or lack of nutrients; (2) Regenerative: when bone marrow responds appropriately to a low erythrocyte mass by increasing production of erythrocytes. In practice, classification based on basic parameters of red cell morphology such as mean corpuscular volume (MCV), allows for a quicker diagnostic approach.¹

Anemia also can be classified according to the form of clinical presentation as acute (usually bleeding or hemolysis) or chronic. Anemia can be classified as microcytic, normocytic or macrocytic, depending on MCV.

Pathogenic classification is very important to understand the mechanisms involved in the genesis of anemia. Investigations that might be warranted include Complete blood count (CBC) including differential, corrected reticulocyte reticulocytes count, RBC indices, Peripheral smear, DCT, LDH, Bilirubin, Haptoglobin, esophagogastroduodenoscopy for the determination of an upper GI bleed, colonoscopy for the determination of a lower GI bleed, and imaging studies if malignancy, or internal hemorrhage is suspected. If a menstruating woman has heavy vaginal bleeding, evaluate the presence of fibroids with a pelvic ultrasound¹.

However, in daily clinical practice, it is more useful to start with the analytical parameters of the hemogram. MCV allows us to classify anemia as microcytic (MCV < 82 fL), normocytic (MCV = 82-98 fL) and macrocytic (MCV > 98 fL). Iron deficiency is the most common cause of anemia, so the first step in diagnosis should be directed toward confirmation or exclusion of IDA. Fe deficiency is the most prevalent nutritional deficiency worldwide⁴.

The prognosis for anemia depends on the cause of anemia. Nutritional replacements of (iron, B12, folate) should begin immediately. In iron deficiency, replacements must continue for at least three months after the normalization of iron levels, in order to restore iron stores. Usually, nutritional deficiencies have a good prognosis if treated early and adequately. Anemia, due to acute blood loss, if treated and stopped early, has a good prognosis. Anemia, if undiagnosed or left untreated for a prolonged period of time can lead to multiorgan failure and can even death. Pregnant women with anemia can go into premature labor and give birth to babies with low birth weight⁵. Anemia during pregnancy also increases the risk of anemia in the baby and increased blood loss during pregnancy.¹ Complications are more common in the older population due to multiple comorbidities⁶.

II. MATERIALS AND METHODS:

The study conducted is an observational study with the samples received in Department of Pathology at SRRI, Trivandrum, Poojappura over a period of 5 months. Adult population, both males and females in the age group of 20-80 years with haemoglobin concentration below the reference range were enrolled in the study. The patients who were on treatment for anaemia were excluded from the study. The haemoglobin concentration, RBC count and blood cell indices (MCV, MCH, MCHC) of patients obtained from H560 fully automated five part haematology analyser. A good quality peripheral smear prepared and stained with Leishmans stain was also assessed for relevant cases. The reference range of haemoglobin was taken as 12.5gm/dl for males and 11gm/dl for females. The reference range of MCV taken as 80-100 fl, MCH 27-32 pg and MCHC as 32-36%. The anemia were categorised based on its severity as mild, moderate and severe based on the WHO classification for grading anemia.

Gender	mild	moderate	severe
Males	12-12.9gm/dl	8-11.9gm/dl	<8gm/dl
Females	11-11.9gm/dl	8-10.9gm/dl	<8gm/dl

III. RESULTS

A total of 48 patients with low hemoglobin who attended the SRRI OPD were taken for the study from the 4800 patients attended the OPD. The cut off hemoglobin was taken as <12.5gm/dl for men and <11gm/dl for women. In

addition to Hemoglobin the red cell indices like MCV, MCH and MCHC were also studied to categorize the type of anemia.

The study shows 68% of the anemia population as females and 32% as males (**Figure 2**). More than 70% of the study population were

having microcytic hypochromic anemia and 29% were with normocytic normochromic anemia (Figure 3). Majority of the microcytic hypochromic patients were females (79%). Among patients with normocytic normochromic anemia more than 57% accounted by males.

Distribution of anemia among different age groups: For the convenience of comparing male and female patients were divided into different age groups of 20-40 years, 40-60 years and more than 60 years. Among females anemic patients mostly comes in the age group of 40-60 years (21/34) followed by age of 20-40 years (9/34) and then in females >60 years (4/34). Microcytic hypochromic blood picture were seen predominantly in the female population of 40-60 years and 20-40 years, but for females >60 years normocytic normochromic blood picture was seen (Figure 4).

In males more number of cases were noted in elderly patients more than 60 years (11/14) and only 3/14 cases were males 40-60 years (Figure 5). No anemic patients were seen in males less than 40 years. In patients >60 years the predominant type of anemia was normocytic normochromic and in males 40-60 years only microcytic hypochromic anemia was noted.

The WHO classification for grading of anemia is taken in the present study and categorized as mild, moderate and severe. Distribution of anemia among the patients is given in Table 1.

Peripheral blood smear examination of patients with severe anemia is performed which showed predominance of microcytic hypochromic RBCs along with elliptocytes and pencil shaped RBC. The histogram and the photomicrograph of the peripheral smear are given below (Figure 1).

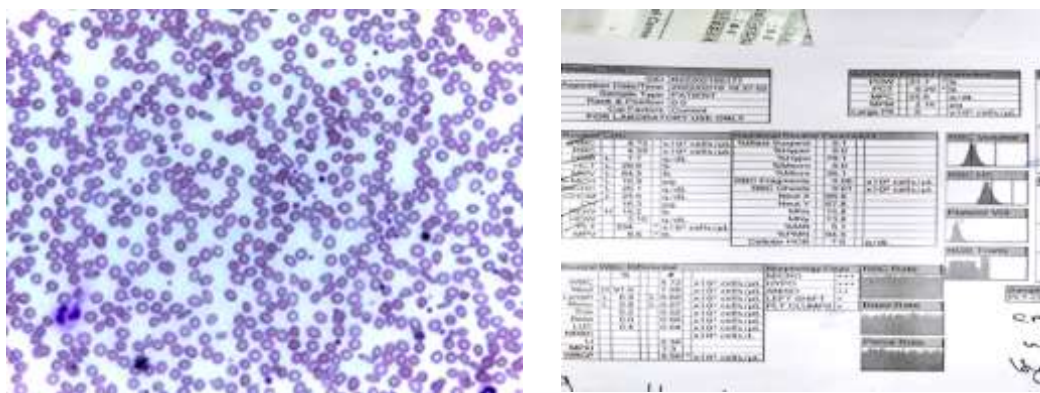


Figure 1: a: Peripheral smear of microcytic hypochromic anemia, b: Histogram of microcytic hypochromic anemia

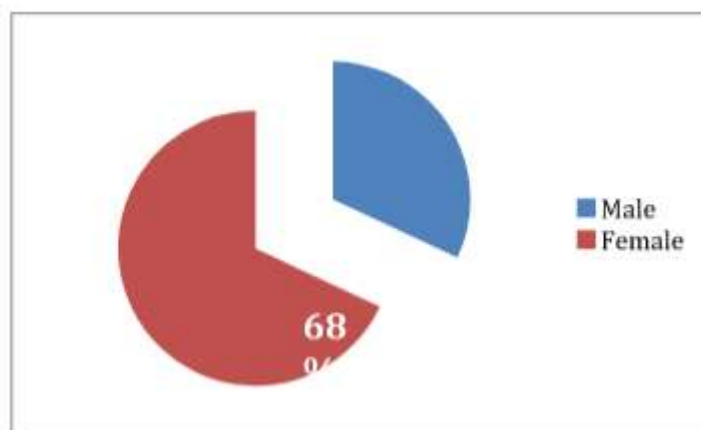


Figure 2: Gender based prevalence of Anemia

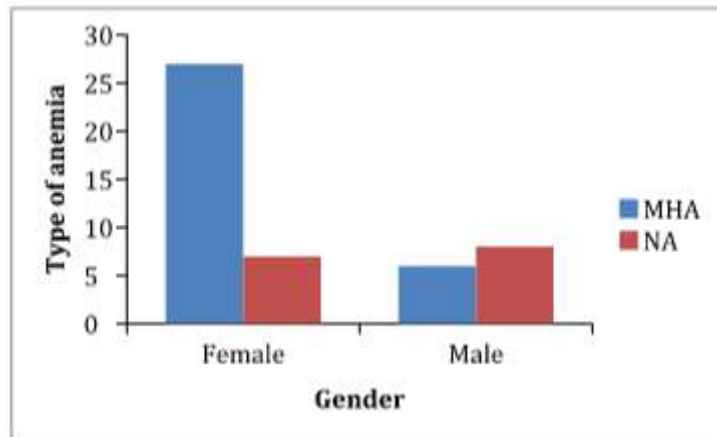


Figure 3: Distribution of the type of anemia

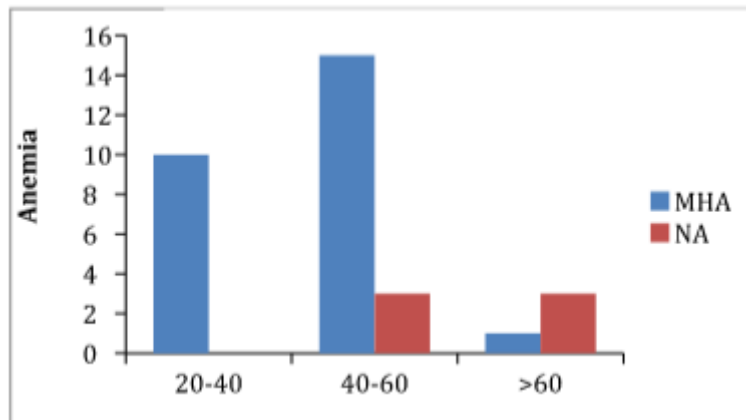


Figure 4: Type of anemia in females

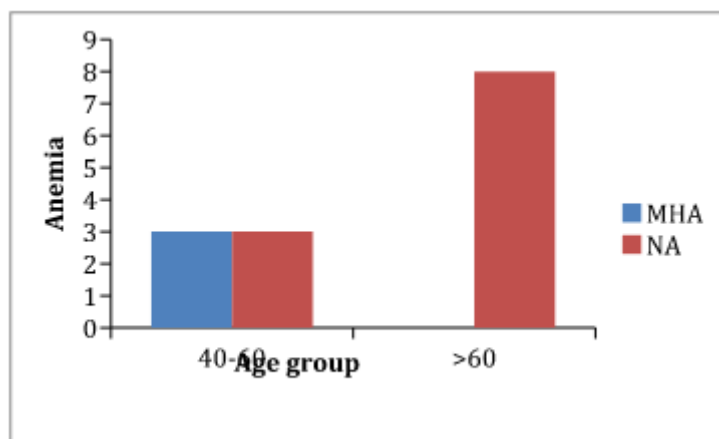


Figure 5: Type of anemia in males

SEVERITY	FEMALE CASES	MALE CASES
MILD	19	5
MODERATE	13	10
SEVERE	1	0
TOTAL	33	15

Table 1: Grading of anemia

IV. DISCUSSION

Anemia is one of the most frequent causes of medical visits because of the high incidence in children, young women and elderly people, especially if malnutrition is present. Moreover, anemia is one of the leading signs in many diseases or is the first evidence of disease observed in routine blood cell enumeration.¹ It is important to diagnose anaemia and also to find out the underlying etiology at an earlier stage itself to prevent further complications like cognitive, mental and developmental delays in children, cardiovascular complications in older population and maternal and fetal complications in Pregnancy. In the present study out of the 4800 patients who attended the OPD 48 patients were found to have anaemia from the haematological parameters over a period of 5 months.

SEX: Anemia is noted more among females than the male population. Also females within the age group of 40-60 years were affected more than the age group of 20-40 and >60 years. Internationally, rates of Fe deficiency are highest for infants and young children during their first 2 years of life and women of childbearing age⁷. Women of childbearing age are at particular risk of Fe deficiency owing to the increased demand for Fe during pregnancy, as well as the Fe losses resulting from menstruation and during childbirth⁸. Other possible causes of Fe deficiency include diets that are low in Fe and high in Fe absorption inhibitors such as phytates and polyphenols⁹.

AGE : Both females and males above 60 years of age were noticed to have normocytic normochromic anemia which may be due to anemia of chronic disease. The most common causes for anemia of chronic disease are inflammatory conditions like osteoarthritis, rheumatoid arthritis and also in malignancies.¹¹ However in our present study the common type of anemia among men less than 60 years of age was microcytic hypochromic, the reason may be due to nutritional deficiency as well as due to gastrointestinal bleeding.¹² Many patients with chronic diseases such as chronic renal failure, chronic inflammatory bowel disease and rheumatoid arthritis are anaemic. Recently

congestive heart failure (CHF) has also been found to be associated with anaemia. In all these diseases this anaemia or chronic disease is at least partially due to excessive production of cytokines and leukotrienes that interfere both with the effect of erythropoietin (EPO) at the bone marrow and the release of stored iron in the reticuloendothelial system.¹⁰

TYPE OF ANEMIA: In our study most female's up to the age of 60 years were affected by microcytic hypochromic anemia possibly iron deficiency anemia. This is justifiable by the fact that most common type of anemia worldwide is iron deficiency anemia, which is caused by a shortage of iron. Women are especially likely to develop this type of anemia for several reasons. First, women aged 12 to 49 lose blood approximately once a month during their periods. Iron is needed to make the new blood that replaces the blood lost with each menstrual period. The risk of anemia is higher among women with periods that are especially long or include very heavy bleeding. Some women also lose iron from uterine fibroids (non-cancerous growths in the womb) that bleed slowly, or from bleeding caused by using certain intrauterine devices (IUDs).

SEVERITY: Anemia can be mild, moderate, or severe (very bad). In the present study predominant cases were coming under mild and moderate category. Only 1 case was reported under severe category. Even if small in number it is important to diagnose and treat the severe cases at the earliest as it can cause unrepairable damages in the body. With severe or long-lasting anemia, the lack of oxygen in the blood can damage the heart, brain, and other organs of the body. Very severe anemia can even cause death. Complications are more predominant in the older population due to multiple comorbidities¹¹. The cardiovascular system is the most commonly affected in chronic anemia. Myocardial infarction, angina, and high output heart failure are common complications. Other cardiac complications include the development of arrhythmias and cardiac hypertrophy. Severe iron

deficiency is associated with restless leg syndrome and esophageal webs. Severe anemia from a young age may lead to impaired neurological development in the form of cognitive, mental, and developmental delays. These complications are unlikely to be amenable to medical management¹

V. CONCLUSION

Anemia is a syndrome, not a disease, and therefore, the etiology must always be investigated and therapy must be directed mainly to the causal disease. In our present study majority of the cases had mild and moderate anemia, hence timely diagnosis and adequate treatment may prevent the patient from further going to complications. This study helps us to provide awareness among the people around the locality, Poojapura about the need for diagnosing anaemia at an earlier stage. We could identify the most vulnerable age group in the study population so that targeted preventive interventions can be taken.

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