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Original Research Article

To differentiate between different types of anaemia morphologically and its distribution in different age groups and sex

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ABSTRACT

Background & Methods : Males who attended various departmental OPDs at tertiary care centre, and inpatients participated in this study as per the inclusion and exclusion criteria. Blood was withdrawn from an cubital vein by mean of dry sterile 5mldisposable plastic syringe with a needle of 20 guage after preparing the cubital fossa with a sterile swab, 3ml of blood was withdraw slowly, immediately blood is transferred to sterile tube with di-potassium EDTA as anticoagulant.

Results: Out of 500 cases, 320 cases were male cases and 180 were female cases. Of these 320 male cases, 98 (30.63%) cases had mild anaemia, 189 cases (59.6%) had moderate anaemia and 33 cases (10.31%) had severe anaemia. Similarly, of 180 female cases, 55 (30.56%) cases had mild anaemia, 101 cases (56.11%) had moderate anaemia and 24 cases (13.33%) had severe anaemia. Male to female ratio is 1.8:1 i.e male outnumbered female in the study. However, the distribution of severity of anaemia did not differ significantly between males and females (P-value>0.05). Out of the 500 cases studied, 50 cases (10%) had >80fl MCV, 319 cases (63.80%) had MCV between 59-80 fl and 131 cases (26.20%) had <59 fl MCV. However, MCV <59 fl noted maximally i.e. 34.75% in 0-5 years age group. The distribution of MCV with age varied significantly (p value <0.05).

Conclusions: Anemia is the most common problem occurring in males in our country, due to various reasons. Prevalence is being higher in Indian scenario, as compared to developed countries. Hence, it is recommended that, this age group is compulsorily screened for anaemia. Study of morphological pattern of anaemia directs us to the further management of underlying etiology.

1. Introduction

The discovery of mathematically derived RBC indices from Wintrobe's hematocrit gave us the mean corpuscular volume (MCV), mean corpuscular hemoglobin concentration (MCHC), and mean corpuscular hemoglobin (MCH).[1] While the meticulous morphological observations of the earlier hematologists have largely remained unchanged, recent mechanical approaches have provided inroads into accurate, precise, and reproducible counts of all the blood cells. Although sophisticated blood cell counting devices rapidly generate hematologic data, correlation with clinical findings and patient history is required for an accurate diagnosis.[2]

The development of knowledge of iron deficiency anaemia and therapeutic use of iron was mentioned in Greek mythology in the story of 'Iphiclus' who was cured of impotence by drinking iron rust dissolved in wine. Much of the iron therapy used by ancient physicians had its origin in such sympathetic magic, the sufferer hoping to assume the strength of steel by drinking water or wine in which a sword had rusted.[3]

Iron deficiency anaemia in males occurs most frequently between the age of 6 months to 3 years and 11 to 17 years. It is a major health problem in males. About 51% of males in 0-4 years and 46% of males in the 5-12 years age group are anaemic in the developing countries.[4]

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Iron deficiency is the most widely recognized medical problem on the planet, and it influences an enormous populace in practically all nations. The most incessant etiologies of frailty are healthful insufficiencies, intestinal sickness, parasitic diseases, blood misfortune, bone marrow substitution, or concealment furthermore, hemoglobinopathies.[5] Arbitrarily, paleness might be named either moderate (7.0-10.0 g/dl) or extreme (<7.0 g/dl). The signs furthermore, indications of paleness are for the most part vague, for example, weariness what's more, shortcoming; it is frequently connected with gastrointestinal indications for example, queasiness, clogging, or diarrhea.[6]

Normocytic hypochromic red cells have the focal territory of polar possessing about 33% of the cell measurement and show decreased staining, with an increment in the focal zone of the pallor.[5] The morphological order of pallor depends on morphological measures of red cells in ideal slim blood film, and furthermore on red cells lists, mean corpuscular volume (MCV), mean cell hemoglobin (MCH) and MCH focus (MCHC). This investigation is led to decide the most widely recognized morphological examples of sickliness among the Saudi pallid populace, and this will give a decent sign about the primary reason for sickliness among such patients, other than planning a decent convention for conclusion.

2. Materials and Methods

All the blood samples from males below 15 years reported by the Department in our institution during the study period with 500 samples.

It is a hospital based cross sectional study. Males who attended various departmental OPDs at tertiary care centre, and inpatients participated in this study as per the inclusion and exclusion criteria.

Blood was withdrawn from an cubital vein by mean of dry sterile 5mldisposable plastic syringe with a needle of 20 guage after preparing the cubital fossa with a sterile swab, 3ml of blood was withdraw slowly, immediately blood is transferred to sterile tube with di-potassium EDTA as anticoagulant.

2.1. Inclusion criteria[5]

All males of:

1. Age group: below 15 years.
2. Those who full fill the WHO criteria for Anaemia.
3. Those males with hemoglobin < 11gm/dl.

2.2. Exclusion criteria

1. Males above 15 year of age
2. Hemoglobin above 11 gm/dl

2.3. Signs and Symptoms of the Anemias

A. The main symptoms are due to cardiovascular system adaptation. There are increased stroke volume and tachycardia and changes in the Hb O2 dissociation curve.

1. There is hyperdynamic circulation leading to tachycardia, a bounding pulse, systolic murmurs, especially at the apex, and cardiomegaly.

2. Older adults may find S/S of congestive heart failure.

B. In some of the patients with anemia, there is no S/S, while mild anemia may have severe S/S.

C. Acute onset effect: There is an effect of the speed of onset; in case of acute onset has more S/S in comparison to the slow onset.

D. The severity of the anemia: In the case of mild anemia, there is no S/S.

When the Hb is <9 to 10 g/dL, it may show S/S.

Even Hb as low as 6 g/dL may not produce severe S/S.

E. Age: The older people tolerate less as compare to young people

F. Hb O2 dissociation curve: The RBCs carry O2 from the lung to the tissue and bring CO2 in the venous blood to the lung. This is dependant upon the 2,3-diphosphoglycerate (2,3-DPG). When the O2 is unloaded, the β-chain of Hb has pulled apart, permitting the entry of the metabolites 2,3-DPG resulting in a lower affinity of the molecule for O2.

2.4. Normally O2 exchange takes place

95% saturated arterial blood with a mean arterial O2 tension of 95 mmHg.

70% saturated venous blood with a mean venous O2 tension of 40 mmHg.

So the curve's normal position depends upon the concentration of 2,3-DPG, H+ ions, and CO2 in the RBCs and on the Hb molecule structure.

3. Results

Table 1: Age wise and gender wise distribution of cases

Gender	Age Group 0-5 years		6-10 years		11-15 years		Total	
	No.	%	No.	%	No.	%	No.	%
Male	174	67.18	77	58.78	69	62.73	320	64.00
Female	85	32.82	54	41.22	41	37.27	180	36.00
Total	259	100	131	100	110	100	500	100

Pearson Chi-Square = 2.765, DF = 2, P-Value = 0.251

Out of total 500 cases, 320 (64%) cases were males and 180 (26%) cases were females. Maximum male cases were of 0-5 years i.e. 174 cases (67.18%) out of total 259 cases under the age group. Female cases showed maximum proportion (41.22%) in 6-10 year age group.

Table 2: Gender wise Distribution of Cases according to Hemoglobin level

Hb Grading	Sex				Total	
	Female		Male			
	No.	%	No.	%	No.	%
Mild	55	30.56	98	30.63	153	30.60
Moderate	101	56.11	189	59.6	290	58.00
Severe	24	13.33	33	10.31	57	11.40
Total	180	100	320	100	500	100

Pearson Chi-Square = 1.095, DF = 2, P-Value = 0.578

Out of 500 cases, 320 cases were male cases and 180 were female cases. Of these 320 male cases, 98 (30.63%) cases had mild anaemia, 189 cases (59.6%) had moderate anaemia and 33 cases (10.31%) had severe anaemia. Similarly, of 180 female cases, 55 (30.56%) cases had mild anaemia, 101 cases (56.11%) had moderate anaemia and 24 cases (13.33%) had severe anaemia. Male to female ratio is 1.8:1 i.e male outnumbered female in the study. However, the distribution of severity of anaemia did not differ significantly between males and females (P-value>0.05).

Table 3: Age wise Distribution of Cases according to Mean Corpuscular Volume (MCV) unit= femtolitre (fl)

MCV Group	Age Group						Total	
	0-5 years		6-10 years		11-15 years			
	No.	%	No.	%	No.	%	No.	%
< 59 fl	90	34.75	30	22.90	11	10.00	131	26.20
59-80 fl	148	57.14	89	67.94	82	74.55	319	63.80
> 80 fl	21	8.11	12	9.16	17	15.45	50	10.00
Total	259	100	131	100	110	100	500	100

Pearson Chi-Square = 27.221, DF = 4, P-Value = 0.000

Out of the 500 cases studied, 50 cases (10%) had >80fl MCV, 319 cases (63.80%) had MCV between 59-80 fl and 131 cases (26.20%) had <59 fl MCV. However, MCV <59 fl noted maximally i.e. 34.75% in 0-5 years age group. The distribution of MCV with age varied significantly (p value <0.05).

4. Discussion

Pediatric anaemia is an important universal problem.[7] Nutritional anaemia is a well known public health problem worldwide. In India, anaemia is affecting more than half of total population, particularly males and pregnant women.[8,9]

Nutritional status of infants largely depends upon the mother's nutritional status. Most males with anaemia are asymptomatic. Iron deficiency is the most common form of nutritional deficiency resulting in increased mortality and morbidity. It is the most common hematologic disease in infants and males worldwide.[10–12] One of the major areas for improvement in primary care is prevention of nutritional deficiency anaemia, as it has been associated with visual and auditory dysfunction, cognitive and behavioral abnormalities and delay in psychomotor development. Hence, its prevention in early childhood is an important health issue.[13,14]

In this study the cases who fulfilled the WHO criteria were taken and divided on the basis of age, gender and other parameters. Cases from 0-15 years of age were taken and grouped as: 0-5 years, 6-10 years and 11-15 years.[15]

5. Conclusion

Anemia is the most common problem occurring in males in our country, due to various reasons. Prevalence is being higher in Indian scenario, as compared to developed countries. Hence, it is recommended that, this age group is compulsorily screened for anaemia. Study of morphological pattern of anaemia directs us to the further management of underlying etiology.

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7. Conflict of Interest

The authors declare they have no conflict of interest.

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