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Original Article

Spectrum of anemia and red cell parameters of patients in a tertiary care hospital in rural South India

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ABSTRACT

Aims: To know the distribution and severity of anemia in different age groups in rural south India. To know the morphological pattern of anemia in all age groups and To know the red cell parameters in elderly patients with anemia. **Material & methods:** A prospective study was conducted by taking two hundred anemic patients. They were divided into four groups (pediatric, adult males & females of 12 – 65 years, and elderly above 65 years). Red cell parameters and peripheral smear examination were done in all patients after taking clinical history. Red cell parameters like hemoglobin, mean corpuscular volume, mean corpuscular hemoglobin concentration, mean corpuscular hemoglobin and red cell distribution width obtained by using auto-analyzer. **Results:** Two hundred cases of anemia studied - 36 cases were in pediatric age group, 61 cases were males aged between 12 - 65 years, 68 cases were females aged between 12 - 65 years, 35 cases were patients aged more than 65 years. Severity of anemia was more among females aged between 12 - 65 years. Iron deficiency anemia was the most common in all age groups followed by normocytic normochromic and dimorphic anemia. All red cell parameters showed decline in elderly patients. Isolated macrocytic anemia was least common and all were due to underlying liver disease. **Conclusion :** Iron deficiency anemia is seen in all age groups. Severity of anemia is more in case of females aged between 12 - 65 years. Dimorphic anemia is more common in elderly patients due to nutritional deficiency. Red cell parameters are seen to decline in all types of anemia in the elderly patients. Timely diagnosis of anemia and correction of its treatable cause may improve the quality of life in elderly individuals. Present study calls for interventions to improve intake of dietary iron, vitamins, better access to healthcare and health education in cases of anemia.

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1. Introduction

Anemia is the most common hematologic disorder. Twenty percent of all hospital admissions among the elderly are due to anemia [1]. Anemia is not a diagnosis in itself, but merely an objective sign of the presence of disease. Anemia reflects the reduction in concentration of hemoglobin or red blood cells in the blood. The mean normal values depend on the age, gender as well as the altitude of residence. Anemia is common in the elderly, primarily from the presence of various diseases in this population,

rather than as a phenomenon of normal ageing. Iron deficiency anemia usually arises from chronic blood loss. The major cause in younger woman is menstruation. In non-menstruating women and in men, the most common source is gastrointestinal hemorrhage. Confirming the type of anemia is critical in improving the overall outcome of treatment and quality of life.

2. Materials & Methods

Material for this study included 200 patients who were diagnosed to have anemia after hemoglobin estimation. Relevant clinical history like age, sex, personal history and history of associated diseases and any drug intake was taken. Hemoglobin, mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration and red cell distribution width were estimated using auto-analyzer. EDTA-treated blood samples were stored in refrigerator and analyzed within 4 hours of collection using auto-analyzer.

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WHO criteria were used as cutoff for hemoglobin concentration.

Age	Hemoglobin (g/dl)
<6 years	11
6-12 years	12
Adult males	13
Adult females	12

Mean corpuscular hemoglobin concentration should be more than 34 in all age groups [2]. Peripheral smears were prepared for detecting the morphology of anemia. All the smears were stained with Leishman's stain and examined under oil-immersion lens of microscope. All 200 cases were divided into four groups – first group of pediatric cases aged below 12 years, second group of adult male patients between 12 – 65 years, third group of adult female patients aged between 12 – 65 years and fourth group of elderly patients aged above 65 years (both male & females).

3. Results

Two hundred cases of anemia studied. Among them, 36 cases were of pediatric age group, 61 cases were males aged between 12 - 65 year, 68 cases were females aged between 12 - 65 years, 35 cases were patients aged more than 65 years. Table 1 shows the distribution of the cases. In the present study, the maximum number of cases seen in females aged between 12 - 65 years. Severity of anemia was more among females aged between 12 - 65 years. Out of 200, 89 patients (44.5%) had microcytic hypochromic anemia, 54 patients (27%) had normocytic normochromic anemia, 48 patients (24%) had dimorphic anemia, 9 patients (4.5%) had macrocytic anemia.

In 36 pediatric patients, 24 (66.6%) had microcytic hypochromic anemia. Out of 68 females aged between 12 - 65 years, 41 (60.3%) had microcytic hypochromic anemia. Out of 61 males aged between 12 - 65 years, 24 (39.3%) had normocytic normochromic anemia. Out of 35 elderly patients, 15 (42.8%) had dimorphic anemia. In pediatric age group and in females aged between 12 – 65 years, microcytic hypochromic anemia was common. Normocytic normochromic anemia was common in males aged between 12 - 65 years. Dimorphic anemia was common in elderly patients aged above 65 years.

Purely macrocytic anemia was seen in adult males and elderly patients only. All nine cases had underlying liver disorder.

Table 2 shows red cell parameters of 35 elderly patients who had anemia. All elderly anemic patients had mean corpuscular hemoglobin concentration less than 34 g/dl. Commonest type of anemia was dimorphic anemia (42.9%), 11 (31.4%) had microcytic hypochromic anemia, 7 (20%) had normocytic normochromic anemia, 2 (5.7%) had macrocytic anemia. Hemoglobin, mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration were reduced in all cases. There was marginal increase in mean corpuscular volume in most cases of macrocytic and dimorphic anemia. Red cell distribution width increased in all cases of microcytic hypochromic anemia.

Table 1. Distribution of cases

Type of anemia	Pediatric (0-12 years)	Male (12-65 years)	Female (12-65 years)	Elderly (>65 years)	Total	Percentage
Normocytic normochromic	11	24	12	7	54	27%
Microcytic hypochromic	24	13	41	11	89	44.5%
Dimorphic	01	17	15	15	48	24%
Macrocytic		07		02	9	4.5%
Total	36	61	68	35	200	100%

Table 2. Red cell parameters of elderly anemic patients

Hb gram/dl	MCV femtolitre	MCH picogram	MCHC gram/dl	RDW-CV (%)	RDW-SD (%)	Peripheral smear
7.6	84	24	29.1	20.1	58.4	DA
8.5	85	23	27.1	19.1	57.2	DA
10.1	64	29	28.1	12.8	55.2	NNA
4.3	62	14	22.5	27.3	56.1	MHA
8.8	87	22	25.5	15.1	50.8	DA
11.3	94	26	28.1	18.7	48.6	MHA
2.5	64	17	26.8	23.2	48.6	MHA
11.3	84	26	28.1	14.7	48.6	NNA
11.1	82	24	26.4	17.9	58.4	NNA
10.2	73	27	28.5	13.4	47.6	NNA
10.0	73	20	24.0	12.2	45.0	NNA
8.8	88	24	27.8	15.8	49.6	DA
8.0	85	25	29.0	15.9	45.3	DA
11.9	94	27	28.8	17.1	54.1	DA
11.5	65	28	30.1	14.2	50.8	NNA
8.1	69	26	29	18.9	45.3	MHA
7.5	89	24	27.2	18.2	59.4	DA
6.7	70	19	27.5	24.5	56.1	MHA
9.5	92	26	28.6	15.3	54.1	DA
4.1	56	15	26.5	22.7	42.1	MHA
8.5	69	21	27.2	19.5	54.1	MHA
10.5	68	25	29	19.1	48.6	MHA
11.5	89	27	30	18.5	59.4	DA
9.6	103	31	30.4	13.8	50.8	MA
11	95	28	30.1	13.9	48.6	DA
10.1	91	28	30.5	16.1	51.8	DA
8.5	69	21	27.2	19.5	54.1	MHA
10.5	68	25	29.0	16.1	48.6	MHA
11.5	89	27	30	18.5	59.4	DA
9.6	103	31	30.4	13.8	50.8	MA
11	95	28	30.1	13.9	48.6	DA
10.1	91	28	30.5	16.1	51.8	DA
10.4	68	26	30.1	14.5	47.6	NNA
4	63	16	25.1	22.3	49.6	MHA
11.5	103	25	27.1	13.8	51.8	DA

DA - Dimorphic anemia, MA - Macrocytic anemia, NNA - normocytic normochromic anemia, MHA - Microcytic hypochromic anemia

Hb - hemoglobin, MCV-Mean corpuscular volume, MCH - Mean corpuscular hemoglobin, MCHC - Mean corpuscular hemoglobin concentration, RDW - Red cell distribution width.

4. Discussion

As early as 1934, Wintrobe presented a scheme for classifying anemia morphologically, based on calculated RBC indices; the scheme became the basis for classifying anemia into 3 categories: 1) normocytic (MCV 80 to 100 fL); 2) microcytic (MCV < 80 fL), and 3) macrocytic (MCV > 100 fL) [3]. In view of the close relationship between anemia and iron deficiency for either individual-based screening or for defining the burden of iron deficiency on a population basis, it is very important to ensure the validity of the hemoglobin cut-off point for the detection of iron deficiency. It is well known that there are a number of physiologic characteristics such as age, sex and physiologic state influence hemoglobin concentration [4, 5]; thus an appropriate anemia cut-off takes into account the normal variations.

On the basis of the WHO criteria, in this study, 68% of anemia cases were seen in females aged between 12 - 65 years, 61% in males aged between 12 - 65 years, 35% in elderly patients and 36% in pediatric age group. Helda khusum et al [6] study found high prevalence of iron deficiency anemia among women; men do not suffer from iron deficiency because of their lower iron requirement. In this study, 20.5% of microcytic hypochromic anemia was seen in females aged between 12 - 65 years and only 6.5% cases was seen in males aged between 12 - 65 years. In today's age of advanced technology used in the diagnosis of many medical problems, the blood film still stands out as an inexpensive and quick diagnostic tool that can generally be performed in most laboratories with basic facilities even in remote areas [7].

Anemia is a common concern in geriatric age group. In this population, it can have significantly more severe complications than in the younger adults and can greatly hamper the quality of life [8]. In 2011, Amit Bhasin et al found normocytic normochromic anemia as common type of anemia in elderly age group [9]. In present study, 42.9% cases were dimorphic anemia, 31.4% were microcytic hypochromic and 20% were normocytic normochromic anemia in elderly age group. The most common cause of anemia worldwide in elderly is anemia of chronic disease [10]. Iron deficiency is frequently seen in elderly, typically as a result of chronic blood loss through GIT [11]. Vitamin B12 deficiency, folate deficiency, MDS are among other causes of anemia in elderly [12].

5. Conclusion

Iron deficiency anemia is seen in all age groups. Severity of anemia is more in case of females aged between 12-65 yrs. Red cell parameters decline in all types of anemia in elderly patients. However, the decline of hemoglobin and concomitant increased anemia with age should not be presumed to be a result of "normal aging" or due to nutritional deficiency and blanket treatment with hematinics should be avoided. Detection of anemia in an older person should prompt appropriate clinical attention. Failure to evaluate anemia in elderly could lead to delayed diagnosis of potentially treatable conditions. Present study calls for interventions to improve intake of dietary iron, vitamins, better access to healthcare and health education in cases of anemia.

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