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Exploring the Morphological Patterns of Anemia in Elderly Patients with Renal Disease: Insights from a Tertiary Care Hospital Study

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Abstract: **Background: Anemia affects over 10% of adults aged 65 and older, with prevalence exceeding 20% in those aged 85 and above. The incidence of chronic kidney disease (CKD) and anemia rises with age. This study evaluates the etiology, morphology, and clinical presentation of anemia in elderly renal disease patients. Methodology: A retrospective cross-sectional study was conducted at a tertiary healthcare centre, enrolling 133 participants according to specific criteria. Data were collected from hospital records, analysing various blood parameters, including hemoglobin levels and blood cell morphology through peripheral blood smears. Results: The study population comprised 133 patients aged 60 and above, 57.8% male and 42.0% female. Anemia severity included mild (23 cases), moderate (79 cases), and severe (31 cases). Among kidney conditions, 74 had CKD, 56 had acute kidney injury, and others included chronic glomerulonephritis and bilateral pyelonephritis. Hypertension and diabetes were the most common comorbidities. Microcytic hypochromic anemia affected 45 patients, 84 had normocytic normochromic anemia, and 3 had macrocytic anemia. Breathlessness was the most frequent clinical finding. Conclusion: This study reveals a high prevalence of anemia in elderly patients, particularly those with chronic conditions like CKD. Moderate anemia is often undiagnosed, with normocytic anemia being the most common type. Hypertension and diabetes mellitus are prevalent comorbidities in this population.**

Keyword: **Anemia, Hemoglobin, Chronic Kindy Diseases, Elderly.**

I. INTRODUCTION

Over 10% of adults aged 65 and older who live in the community are classified as having anemia, according to the World Health Organization (WHO) criteria. Anemia is having a hemoglobin level of less than 12 g/dL for women and less than 13 g/dL for men. The prevalence of anemia increases significantly with advancing age, surpassing 20% among individuals aged 85. Anemia is an independent predictor of negative outcomes in various diseases, especially among the elderly. It is predominantly associated with a decline in quality of life, diminished cognitive function and overall ability, as well as increased risks of falls, infections, morbidity, and mortality.[1] Kidney function typically deteriorates with age, though this is not universally observed. Approximately one-third of older people do not show a deterioration in renal function as they age. This observation suggests that a decrease in glomerular filtration rate (GFR) is not a natural part of aging but may be linked to hypertension, cardiovascular disease, or diabetes mellitus. At age 80, average GFR ranges from 50 to 80 mL/min, compared to 120 mL/min or higher in those aged 20 to 40. Despite the decline in GFR with age, serum creatinine levels typically remain stable or show only slight increases in the absence of chronic diseases.[2]

Patients experiencing renal failure frequently develop anemia, primarily due to the reduced production of erythropoietin by the kidneys and the increased breakdown of erythrocytes. Epidemiological studies have revealed a significant increase in the prevalence of chronic kidney disease (CKD) and anemia associated with advancing age.[3],[4] These two prevalent chronic conditions contribute to heightened morbidity and mortality rates, functional decline, hospitalizations, and escalating healthcare costs.

II. METHODOLOGY

Following the approval of the Institutional Ethical Committee (IEC), a retrospective cross-sectional study was conducted at a tertiary healthcare center that serves a wide range of medical specialties. This study successfully enrolled a total of 133 participants, carefully selected according to predefined inclusion and exclusion criteria. To gather comprehensive laboratory and clinical information, data were extracted from the hospital information system as well as patient medical records. The study involved a thorough analysis of various blood parameters, including hemoglobin levels, hematocrit, red blood cell count(RBC), white blood cell count(WBC), red blood cell indices, and platelet counts, all measured using a sophisticated hematology autoanalyzer. Additionally, peripheral blood smear examinations were performed utilizing Leishman's stain to assess the morphology of blood cells.

In accordance with hospital protocols, the results of the blood investigations were obtained from the central laboratory, with tracking facilitated by each patient's unique identification details, including their name, age, gender, inpatient (IP) number, request number, and the date of the investigation. Clinical data pertaining to each patient was meticulously recorded using clinical record sheets. The collected numerical data underwent detailed analysis using Microsoft Excel, allowing for the presentation of results in terms of frequency and percentage, illustrated through well-organized tables and informative charts. This structured approach ensured clarity in the presentation of findings, contributing valuable insights into the study population.

III. RESULT

A cross-sectional retrospective study was conducted at a tertiary care hospital in South India. This study involved 133 elderly patients with renal disease, aged 60 years and above.

Table 1: Gender-wise age group distribution of study subjects

GENDER-WISE AGE GROUP						
	Male		Female		Total	
Age group	Frequency	Percent	Frequency	Percent	Frequency	Percent
60 – 65	29	21.81	16	12.03	45	33.83
66 – 70	17	12.78	16	12.03	33	24.83
71 – 75	14	10.52	10	7.51	24	18.04
76 – 80	9	6.76	7	5.26	16	12.03
>=80	8	6.01	7	5.26	15	11.27
Total	77	57.8	56	42.2	133	100

Table 1 shows the age group prevalence of anemia: 57.8% of cases are males and 42.2% are females. The majority of male cases fall within the age group of 60 to 65, representing 21.81%, while the predominant female age group is 60 to 70, accounting for 12.3%.

Table 2: Distribution of study subjects according to their Hemoglobin level

HEMOGLOBIN VS RENAL DISEASE			
Hemoglobin	Severe	Count	31
		%	23.30%
	Moderate	Count	79
		%	59.40%
	Mild	Count	23
		%	17.30%
Total		Count	133
		%	100.00%
a. X2=4.689 p=0.096 ns			

Table 2 displays the prevalence of anemia in subjects with renal disease. Among these subjects, 23 (17.30%) had mild anemia, 79 (59.40%) had moderate anemia, and 31 (23.30%) had severe anemia, with a p-value of 0.096.

Table 3: Distribution of conditions leading to renal disease-associated anemia

Conditions of renal diseases causing anemia	
Renal Diseases	Frequency
Chronic kidney disease	74
Acute kidney injury	56
Chronic glomerulonephritis	2
Bilateral pyelonephritis	1

The table above (Table 3) presents the etiology of anemia. Among the cases related to renal conditions, 74 exhibited chronic kidney disease, 56 presented acute kidney injury, 2 were associated with chronic glomerulonephritis, and 1 was linked to bilateral pyelonephritis.

Table 4: Distribution of study subjects of renal disease with its co-morbidities

Renal disease with its comorbidities	
Comorbidities	**Frequency**
Hypertension	101
Diabetes Mellitus	81
Urinary Tract Infection	14
Covid 19	12
Sepsis	12
Cellulitis	8
Seizure	6
Fracture	4
Diabetic foot ulcer	3
Parkinson's Disease	3

In a study of renal disease conditions, hypertension was found to be the most prevalent, with 101 subjects affected. This was followed by 81 cases of diabetes mellitus, 14 cases of UTI, and 12 cases each of COVID-19 and sepsis. Additionally, 6 cases of seizure, 4 cases of fracture, and 3 cases each of diabetes foot ulcer, and Parkinson's disease were observed. (Table 4)

Table 5: Peripheral blood smear pattern with gender-specific distribution of renal disease cases.

PBS PATTERN, GENDER, WITH RENAL DISEASES			
	Male	**Female**	**Frequency**
MCHC	23	22	45
NCNC	51	33	84
Macrocytic	2	1	3
PAN	1	0	1
Total	77	56	133

Out of the 133 cases, 77 were male and 56 were female. Among these cases, 45 displayed microcytic hypochromic anemia, with 23 males and 22 females affected. Additionally, 84 patients had normocytic normochromic anemia, with 51 males and 33 females experiencing this type of anemia. In 3 cases, macrocytic anemia was observed, with 2 males and 1 female affected. Furthermore, one male patient was diagnosed with pancytopenia. (Table 5)

Table 6: Study Subjects with their clinical presentation

Clinical Presentation	
	Frequency
Fever	31
Cough	33
Breathlessness	40

Weakness	22
Abdominal Pain	29
Vomiting	21
Chest pain	12
Fatigue	11
Loss stool	8
Loss of appetite	4
Nausea	8
Dyspnea	8
Pedal edema	8

The table above illustrates the clinical features. The most common feature was breathlessness, with 40 cases, followed by cough in 33 cases and abdominal pain in 29 cases.

IV. DISCUSSION

Our study confirms that anemia is common among older individuals. The present study included elderly patients with ages ranging from 60 to 92 years. The majority of patients fell within the 60-65 age group, and there were more male patients compared to female patients. This finding is consistent with the results of studies by Bhasin et al [5], Prakash KG et al [6], and Shrivastava SR et al [10]. Regarding the degree of anemia, the study found that the majority of subjects had moderate degrees of anemia, with a smaller number presenting severe degrees, and the least having a mild degree, in both genders. These results are in line with those reported by Tettamanti M et al. [7] However, Prakash KG et al [5] had contrasting findings, with the majority of subjects exhibiting severe degrees of anemia and the least having a mild degree.

Our research indicates that the most common form of anemia observed among our patients was anemia of chronic disease (CKD), which accounted for 110 cases (82.7%). This was followed by iron deficiency anemia, which affected 21 patients (15.7%). Additionally, only one patient (0.75%) was identified with folic acid deficiency and one with vitamin B12 deficiency. These results are consistent with the findings reported by Prakash KG et al. [6] and Bhasin A et al. [5] Hypertension is a common comorbidity of anemia, accounting for 59.4% of cases, with the majority of subjects exhibiting a moderate degree of anemia. The findings are comparable with Lamba et al [8] shows 30%, and Alsaeem M et al [9] 74%. Male patients are predominantly represented among hypertensive subjects. The morphological pattern of anemia commonly correlated with renal disease is Normocytic Normochromic, especially in males, followed by microcytic hypochromic anemia, with similar occurrences in both genders. This finding is consistent with the results of studies by Bhasin et al [5], Prakash KG et al [6].

V. CONCLUSION

This research highlights a significant occurrence of anemia in the elderly demographic, particularly among individuals suffering from chronic health conditions such as chronic kidney disease. A considerable segment of those with moderate anemia remains undiagnosed, with normocytic anemia identified as the predominant variant in these patients. Additionally, hypertension and diabetes mellitus frequently co-exist as common comorbidities, exacerbating the clinical picture. In terms of clinical manifestations, elderly patients often report symptoms like breathlessness, cough, and abdominal pain. These clinical features collectively underscore the importance of vigilant screening and diagnosis in this vulnerable population to ensure timely and effective management of anemia and associated conditions.

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