Section: Pathology

Original Research Article

A STUDY OF VARIOUS HEMATOLOGICAL PATTERNS OF ANAEMIA IN GERIATRIC AGE GROUP – A PROSPECTIVE OBSERVATIONAL STUDY

Reema Bhushan[1], Arun Jain[2], Harshvardhan Gupta[3]

[1]Assistant Professor, Department of Pathology, GR Medical College, Gwalior, Madhya Pradesh, India.
[2]Designate Professor, Department of Pathology, GR Medical College, Gwalior, Madhya Pradesh, India.
[3]Post Graduate Resident, Department of Pathology, GR Medical College, Gwalior, Madhya Pradesh, India.

Received : 20/04/2026
Received in revised form : 07/06/2026
Accepted : 22/06/2026

Keywords:
Indices, Iron Deficiency, Folate Deficiency

Corresponding Author:
Dr. Reema Bhushan
Email: drreems25@gmail.com

DOI: 10.47009/jamp.2026.8.4.33

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2026; 8 (4); 173-179

ABSTRACT

Background: The term "geriatric" refers to medical care for older adults, an age group that is not easy to define precisely. Anaemia is a prevalent illness among the elderly population as well. **Material and Methods:** The present study was conducted in the Department of Pathology, over a period of one and half year. History and other relevant data were collected from patients. Male patients aged 60 years and above with Hb%<13.2 gm/dl and female patients of 60 years and above with Hb% < 12.2 gm/dl1were included in the study. Under aseptic precautions, five milliliters of venous blood were obtained in EDTA and plain vial. Hemoglobin concentration, Red blood cell indices. (MCV, MCH, MCHC), Red cell distribution width (RDW), Reticulocyte count, Peripheral blood smear examination for red cell morphology, hemoglobin concentration, serum vitamin B12 and serum folate was determined. Statistical analysis was and p value was less than 0.05 was considered statistically significant. **Results:** Majority of the study participants were in age group 66-70 years (49.0%) and 71-75 years (40.3%) with 50.3% female and 49.7% male. Iron Deficiency Anemia was the commonest (20.3%) followed by folate Deficiency (20.0%). Fifty two percent had moderate anemia (7-9 g/dL). 42.1% of participants had MCV > 96 fL. 42.4% of participants had normal MCH (27-33 pg/cell). There was no significant difference in MCV, MCH and MCHC between genders. 61.7% of participants had MCHC < 33 g/dL. 69.3% of study participants had vitamin B12 deficiency (<200 pg/mL) and 41% of the participants had folate deficiency (<3 µg/L). 62.8% of participants had RDW > 14.5%. **Conclusion:** Present comprehensive study on hematological patterns of anemia in the geriatric population has provided valuable insights into the complex nature of anemia in older adults. The study, which focused primarily on individuals in their late 60s and early 70s, with a balanced gender representation, has revealed several key findings that contribute to our understanding of anemia in this age group.

INTRODUCTION

Anemia is described as a reduction in the proportion of the red blood cells. It is not a diagnosis in itself, but a presentation of an underlying condition.[1] According to the World Health Organization (WHO), Anemia is a condition in which the number of red blood cells or the hemoglobin concentration within the red cells is lower than normal, leading to reduction of ability of the blood to carry oxygen to the body's tissues. The ageing process is not uniform across the population due to differences in genetics, lifestyle, and overall health, and chronological age. Therefore, there are no concrete definitions of "elderly" or "geriatric" that appropriately characterize this patient population. The specific thresholds for defining anemia may vary slightly based on factors mentioned along with underlying health conditions in geriatric individuals (ideally aged 65 and older). World Health Organization (WHO) and other health organizations typically use the following hemoglobin levels to define anemia (including geriatric population) as Hemoglobin levels less than 13.0 grams per deciliter (g/dL) for adult males and less than 12.0 g/dL for adult females.[2]

The prevalence of anemia in the geriatric population varies depending on the specific type and the setting

ISSN (O): 2687-5365; ISSN (P): 2753-6556

(community-dwelling, hospitalized, or nursing home.[4] The prevalence of anemia in those aged 60 years and above is 39% globally and 54.1% in Asia.[5] According to a study, in India, the prevalence of anemia is 37.88% in the elderly patients.[6] Another study reported a high prevalence of anemia among elderly subjects living in high-altitude regions of rural India[7] The prevalence of anemia was highest in the eastern, central, and northern states of India, with the northeastern states having the least prevalence of anemia. Anemia was significantly associated with age group and sex, with the highest prevalence in the 80 years and above age category and in females.[8]

AETIOLOGY OF GERIATRIC ANEMIA

In the geriatric population, anemia can be of various aetiologies with different causes and symptoms:[4,9,10,11] The aetiology of anemia may make a difference in morbidity and mortality risk[11] However, anemia in elderly can be broadly classified into three major types: nutritional deficiencies, anemia of chronic diseases and unexplained anemia of elderly. Iron deficiency anemia (IDA) is a prevalent condition in the elderly, marked by a decrease in the body's iron stores, hampering erythropoiesis and resulting in insufficient production of hemoglobin. The pathophysiology of IDA has multiple important aspects: impaired iron absorption, chronic blood loss, inadequate dietary intake, menstrual cessation and postmenopausal bleeding, impaired iron utilization, coexisting chronic diseases, impaired erythropoiesis.[4,12,13,14,15] Vitamin B12 and folic acid deficiency anemia share a common pathophysiology involving impaired DNA synthesis, leading to ineffective erythropoiesis and the production of large, immature red blood cells (megaloblasts). In the elderly population, these deficiencies often result from various factors, including dietary insufficiency, malabsorption, and age-related changes[16] The pathophysiology of anemia of chronic disease (ACD) involves a complex interplay of the immune system, inflammatory mediators, and iron metabolism. ACD is a type of anemia that is commonly seen in patients with chronic inflammatory conditions, such as autoimmune diseases, chronic infections, and malignancies.[17] When no etiology is identified, patients may be classified as having unexplained anemia (UA) or clonal cytopenia of unknown significance (CCUS). This type of anemia may be linked to myeloid neoplasms, the existence of inflammatory cytokines, bone marrow irregularities, and androgen deficiencies.[18,19] Anemia is a common manifestation of MDS, and it is present in 85% of patients when the disease is first diagnosed. Bone marrow cells display aberrant morphology and maturation (dysmyelopoiesis).[20] The pathophysiology of anemia in chronic kidney disease (CKD) is multifactorial and involves several mechanisms. However, the primary factor leads to anemia in chronic kidney disease is decreased endogenous erythropoietin (EPO) production.[21] Hypothyroidism leads to lower erythropoietin production, contributing to impaired erythropoiesis and a subsequent decrease in red blood cell production.[22]

The clinical presentation of anemia in the elderly is characterized by subtle and insidious symptoms, often requiring a comprehensive evaluation due to the physiological adaptations in elderly individuals. Specific symptoms depend on the degree of hemoglobin decrease and concurrent medical conditions, posing challenges in identifying anemia-related symptoms.[23] The relationship between anemia and adverse outcomes appears complex and context-dependent.[24] There is Increased mortality and hospitalization.[25] in elderly. There is more osteoporotic fractures risk (in men), which rises as hemoglobin (Hb) levels decrease.[26] There is also Increased risk of stroke especially in elderly women.[27] Additional complicating factors being Impaired quality of life and increased frailty (High WHO disability score)[28], Longer hospital stays, [19], poor muscle strength leading to increased risk of falls, which can lead to healthcare costs in older people.[26]

Diagnosing anemia in the elderly parallels the approach applied in younger adults, encompassing an investigation into potential causes such as hemolysis, nutritional deficiencies, gastrointestinal bleeding, chronic infections, malignancies, hepatic or renal diseases, and other chronic ailments. In male individuals with anticipated unexplained anemia (UAE), assessing testosterone deficiency becomes a consideration. A study involving men with low testosterone revealed that 54% of those with presumed UAE experienced a hemoglobin increase of >1 g/dL after one year of testosterone treatment, in contrast to 15% of men treated with a placebo.[19]

Aim

The aim of the present study is to study the clinico-hematological patterns of anemia in elderly aged 60 years and above.

Objectives

To detect the morphological types of anemia prevalent among the elderly in the age group of 60 years and above and to identify important factors responsible for incidence of anemia in elderly.

MATERIALS AND METHODS

The present study was conducted in the Department of Pathology, Gajra Raja Medical College, Gwalior, Madhya Pradesh over a period of one and half year. (May 2024 to November 2025). This was a prospective observational study. Samples were received in the Central Pathology Lab (CPL), Department of Pathology, Gajra Raja Medical College, Gwalior. History and other relevant data were collected from patients or their attenders and also from physicians, medical records and case files from patients. Present study was conducted after the approval from the Institutional Ethics Committee

ISSN (O): 2687-5365; ISSN (P): 2753-6556

(Human) and with written informed consent from each patient after explaining the study procedure to them in their own understandable language. The following criteria were adopted for selection of cases: According to WHO, Male patients aged 60 years and above with Hb%<13.2 gm/dl. Female patients of 60 years and above with Hb% < 12.2 gm/dl1. Consent was obtained from the patient.

Patients who were below 60 years of age, who received blood transfusion in last 3 months, patients on chemotherapy/radiotherapy and those who do not give consent were excluded from the study. Patients meeting the eligibility criteria was scrutinized and subsequently informed written consent was taken. After a thorough history and clinical examination, the blood sample was collected. Under aseptic precautions, venipuncture was done. Five milliliters of venous blood were obtained by the routine phlebotomy procedure. The samples were collected in the EDTA (ethylene diamine tetra acetic acid), as well as in plain vacutainer for pathology and biochemichal parameters respectively. The samples collected were analyzed within two hours of collection. The following parameters are assessed for each case: Hemoglobin concentration, Red blood cell indices. (MCV, MCH, MCHC), Red cell distribution width (RDW), Reticulocyte count, Peripheral blood smear examination for red cell morphology, hemoglobin concentration. The hematology parameters, haemoglobin concentration, Red cell indices (MCV, MCH, MCHC) and Red cell distribution width (RDW) were analyzed using the automated Haematology analyzer. Serum vitamin B12 and serum folate was determined by CLIA (Chemiluminescence Immunoassay) method using fully automated immune assay system.

Data was compiled using MS Excel and statistical analysis was done using the computer program, Statistical Package for Social Sciences (SPSS for Windows, version 21.0 Chicago, SPSS Inc.) software. Categorical data was expressed as frequency and percentage whereas continuous data was expressed as mean and standard deviation. Statistical analysis was performed using ANOVA for normally distributed data and Chi-square tests for categorical data. P value was less than 0.05 was considered statistically significant.

RESULTS

Present study included 290 geriatric patients, with the majority falling in the 66-70 years age group (49.0%) and the 71-75 years age group (40.3%). A smaller proportion of participants were in the 61-65 years (5.9%) and 76-80 years (4.8%) age groups. Out of the 290 participants, 146 (50.3%) were female, while 144 (49.7%) were male. The 290 participants were evenly distributed across five types of anemia. Iron Deficiency anemia was the most common, affecting 20.3% of the participants, followed by Folate Deficiency, Vitamin B12 Deficiency and Mixed Deficiency, each affecting 20.0%. While Anemia of Chronic Disease was observed in 19.7%. Out of 290 total participants, none had hemoglobin levels below 7 g/dL. The majority (52.1%) had hemoglobin levels between 7-9 g/dL, while the remaining 47.9% had levels between 9-11 g/dL. In the age group 61-65 years, 58.8% of the participants had hemoglobin concentration between 7-9 g/dL while 41.2% had 9-11g/dL. Similarly, in the age groups 71-75 and 76-80, majority of the participants (61.5% & 71.4% respectively) had hemoglobin concentration between 7-9 g/dL. The overall mean and standard deviation of hemoglobin concentration among the study participants was 9.15 ± 0.64 g/dL. The 66-70 age group had the highest mean at 9.32 ± 0.75 g/dL, while the 71-75 group had the lowest at 8.97 ± 0.44 g/dL. The differences between age groups were statistically significant ($p<0.001$).

Out of 290 participants, 42.1% had Mean Corpuscular Volume (MCV) greater than 96 fL, 34.8% had an MCV between 80-96 fL, and 23.1% had an MCV less than 80 fL. In the 61-65 age group, the majority (70.6%) had an MCV below 80 fL. For the 66-70 age group, the distribution was more even, with 38.7% in the 80-96 fL range followed by 31.7 % had above 96 fL. In the 71-75 and 76-80 age groups, the majority had an MCV above 96 fL (55.6% and 57.1% respectively). The overall mean and standard deviation of MCV was 94.43 ± 14.20 fL. The data was found to be statistically significant($p<0.001$). The mean MCV increased with advancing age, from 83.88 fL in the 61-65 age group to 100.50 fL in the 76-80 age group. The distribution was similar between males and females, with the largest percentage in both groups having an MCV above 96 fL (41.8% for females and 42.4% for males). There was no statistically significant difference between genders ($p=0.780$). Females had a mean MCV of 94.21 ± 14.03 fL, while males had a mean MCV of 94.67 ± 14.06 fL. The overall mean MCV and standard deviation was 94.43 ± 14.02 fL.

Out of 290 participants, 42.4% had Mean Corpuscular Hemoglobin (MCH) values within the normal range of 27-33 pg/cell. 36.6% had low MCH values below 27 pg/cell, while 21% had high MCH values above 33 pg/cell. In the 61-65 age group, most participants (70.6%) had low Mean Corpuscular Hemoglobin (MCH). The 66-70 age group, 52.8% also showed a low MCH followed by 33.1% had normal MCH. However, in the 71-75 age group, the majority (58.1%) had normal MCH. The 76-80 age group had the highest percentage (42.9%) of high MCH values. There's a clear trend of increasing MCH with age, from a mean of 25.76 pg/cell in the 61-65 age group to 31.29 pg/cell in the 76-80 age group. The overall mean MCH was 29.02 pg/cell. The difference between age groups was statistically significant ($p<0.001$). Among females, 40.4% had low MCH, 37.7% had normal MCH, and 21.9% had high MCH. For males, 32.6% had low MCH, 47.2% had normal MCH, and 20.1% had high MCH. Males had a slightly higher mean MCH (29.11 ± 3.73

ISSN (O): 2687-5365; ISSN (P): 2753-6556

pg/cell) compared to females (28.94 ± 4.03 pg/cell). However, this difference was not statistically significant (p=0.705), indicating that gender does not significantly influence MCH in this study population.

Out of 290 participants, 61.7% had Mean Corpuscular Hemoglobin Concentration (MCHC) below 33 g/dL, while 38.3% had MCHC between 33-36 g/dL. No participants had an MCHC above 36 g/dL. The overall mean MCHC was 32.92 g/dL. The differences between age groups were statistically significant (p<0.001). Males had a slightly higher mean MCHC (33.00 ± 1.58 g/dL) compared to females (32.85 ± 1.83 g/dL). However, this difference was not statistically significant (p=0.453).

Among the 290 study participants, none had an RDW-CV below 11.5%. The majority (62.8%) had an RDW-CV greater than 14.5%, while 37.2% had within the normal range of 11.5-14.5%. In the 71-75 age, 89.7% of the study participants showed RDW-CV above 14.5% followed by 10.3% had normal RDW-CV. Conversely, the 61-65 age group had the lowest proportion of elevated RDW-CV, with only 29.4% above 14.5%. The 66-70 age group was more evenly split, with 43.7% having elevated RDW- CV. The overall mean and standard deviation of RDW-CV was 15.42 ± 1.52%. The 71-75 age group had the highest mean RDW-CV at 16.11 ± 1.16%, while the 66-70 age group had the lowest at 14.86 ± 1.54%. The difference in RDW-CV across age groups was statistically significant (p<0.001). The proportions were similar between males and females, with 64.6% of males and 61.0% of females having RDW-CV values above 14.5%. Males had a slightly higher mean RDW-CV (15.44%) compared to females (15.40%), but this difference was not statistically significant (p=0.819).

Macrocytic anemia was the most common type, observed in 40% of the participants. Microcytic and dimorphic anemia were equally prevalent at 20.3% and 20% respectively. Normocytic anemia was the least common, seen in 19.7% of the participants. The study included participants aged 61-80 years, divided into four age groups. Macrocytic cells were the most common across all age groups except for 61-65 years, where microcytic cells dominated. The 71-75 age group had the highest percentage of dimorphic cells (34.2%) and macrocytic cells (51.3%). Microcytic cells were most prevalent in the 61-65 age group (70.6%) and decreased with age. Normocytic cells were most common in the 66-70 age group (31.0%). p-value <0.001 indicate a statistically significant relationship between age and cell morphology distribution. Macrocytic cells were the most common in both genders (around 40%), followed by dimorphic, microcytic, and normocytic cells, each accounting for approximately 20% in both genders. However, the difference was not statistically significant. In the 71-75 age group, highest percentage of study participants had of B12 deficiency, with 82.1% having levels below 200 pg/mL. The overall mean and standard deviation of serum vitamin B12 was 179.48 ±43.38 pg/mL. The 66-70 age group had the highest mean at 194.86 ± 41.68 pg/mL, while the 71-75 age group had the lowest at 160.26 ± 38.64 pg/mL. The difference in means across age groups was statistically significant (p<0.001). Females had a slightly higher rate of B12 deficiency (71.2%) compared to males (67.4%), but the difference was not substantial.

Out of 290 participants, 119 (41.0%) had serum folate levels below 3 µg/L, while 171 (59.0%) had levels within the normal range of 3-15 µg/L. Notably, no participants had serum folate levels above 15 µg/L. Among the age groups, study participants between 61-65 years old had the highest proportion of normal folate levels (76.5%) followed by the age group 66- 70 years with 68.3% in the normal range of serum folate. Conversely, 53.0% in the 71-75 age group showed low folate levels. The overall mean and standard deviation of serum folate was 3.38 ± 1.14 µg/L. For males, 57.6% had normal levels, and 42.4% had low levels. The gender distribution of folate levels was relatively similar. Females had a slightly higher mean (3.40 ± 1.15 µg/L) compared to males (3.35 ± 1.13 µg/L). However, this difference was not statistically significant (p=0.737).

Out of 290 participants, the majority (91.7%) had a reticulocyte count within the normal range of 0.5-1.5%. A small proportion (7.9%) had a count below 0.5%, while only one participant (0.3%) had a count above 1.5%. Across all age groups, the majority of participants fell within the normal range (0.5-1.5%). The 61-65 age group had the highest percentage (17.6%) of participants with low reticulocyte counts (<0.5%). The 66-70 and 76-80 age groups had the highest percentages of participants within the normal retic count range (93.0% and 92.9% respectively). There was a slight trend of decreasing mean reticulocyte count with increasing age, from 1.13 ± 0.38 % in the 61-65 age group to 0.96 ± 0.29 % in the 76-80 age group. However, the difference was not statistically significant (p=0.208). A higher percentage of males (93.1%) had normal reticulocyte counts compared to females (90.4%). Only one male participant had a high reticulocyte count. Males had a slightly higher mean reticulocyte count (1.05 ± 0.31) compared to females (1.01 ± 0.30), but this difference was not statistically significant (p=0.313).

DISCUSSION

The present study involved 290 geriatric patients, with the majority in the 66-70 years age group (49.0%) and the 71-75 years age group (40.3%), with smaller proportions in the 61-65 years (5.9%) and 76-80 years (4.8%) age groups. Bhasin et al. reported a mean age of 70.51 years.[29] Raghavan NT et al. also found that 44% of their anemic elderly subjects were in the 60-69 age range, hence in concordance with present study(30). Conversely, Alwar V et al. noted an increase in anemia prevalence with age, reaching 63.88% in those over 75 years.[6]

ISSN (O): 2687-5365; ISSN (P): 2753-6556

In the present study, the gender distribution was nearly even, with 146 females (50.3%) and 144 males (49.7%). This even gender distribution is similar to findings by Bhasin et al., who reported 52% male and 42% female participants in their study.[29] This balanced demographic allows for a comprehensive analysis of hematological patterns of anemia across a broad spectrum of the elderly population.

The present study participants were evenly distributed across five types of anemia. Iron deficiency anemia was the most prevalent, affecting 20.3% of participants, followed closely by folate deficiency, vitamin B12 deficiency, and mixed deficiency, each at 20.0%. Anemia of chronic disease was observed in 19.7% of participants. Similar trend was seen in study done by Guralnik et al,[31] Raghavan NT et al.[30] The study revealed significant patterns of hemoglobin levels among geriatric patients. The majority of participants (52.1%) exhibited moderate anemia (7-9 g/dL), while 47.9% had mild anemia (9-11 g/dL). Singh et al. reported that among anemic elderly patients, 67.39% had mild anemia and 15.22% had moderate anemia.[32] Raghavan NT et al. also found that 68.8% of their elderly anemic subjects had mild anemia and 26.3% had moderate anemia.[30] However, no severe cases (<7 g/dL) were observed in present study.

Gender analysis revealed a slightly higher proportion of females (51.4%) in the mild anemia range compared to males (44.4%) in the present study, though the difference in mean hemoglobin levels between genders was not statistically significant (p=0.602). The study findings by Guralnik et al partially aligns with more females having mild anemia, though they found slightly higher overall anemia rates in men.[75] Present study found no significant gender difference in mean hemoglobin levels. However, Singh et al. reported higher anemia prevalence in elderly females.[32]

The study revealed significant variations in red blood cell indices among geriatric patients with anemia. Mean Corpuscular Volume (MCV) analysis showed 42.1% of participants having macrocytic anemia (MCV >96 fL), with a trend of increasing MCV with age (p<0.001). Maximum MCV was seen in 71–75 year age group. Mean Corpuscular Hemoglobin (MCH) values were diverse, with 42.4% in the normal range (27-33 pg/cell), and a clear trend of increasing MCH with age (p<0.001). Mean Corpuscular Hemoglobin Concentration (MCHC) was predominantly low, with 61.7% below 33 g/dL, again showing an age-related increase (p<0.001). Interestingly, gender differences in these indices were not statistically significant. Similarly, Guralnik et al. found that approximately one-third of anemia cases in the elderly were due to nutrient deficiency, which often presents as macrocytic anemia.[31] Petrosyan et al also noted that macrocytosis was more common in older age groups.[33] However, Alwar V. et al. reported normocytic anemia as the most common type (62%), followed by microcytic (30%).[6] Similarly, Singh et al. found normocytic normochromic anemia to be the most prevalent (37.68%).[32]

Present study showed that macrocytic anemia prevalence increases with age, while microcytic anemia decreased. The 71-75 age group showed the highest prevalence of both macrocytic (51.3%) and dimorphic (34.2%) anemia. Significantly, the 61-65 age group had a high prevalence of microcytic anemia (70.6%). These age-related differences were statistically significant (p<0.001), suggesting that anemia etiology may vary with age in the geriatric population. Aligning with the present study, Alwar V. et al. also observed an increased prevalence of macrocytic anemia in the subgroup aged over 75 years.[6] However, El-Shafei et al. found iron deficiency anemia (often microcytic) to be most frequent in the 60-65 age group, but at a lower rate (42.4%) in comparison with present study.[34] Contrasting to present study, Singh et al. found dimorphic anemia in only 8.70% of cases.[32]

Present study revealed significant variations in Red Cell Distribution Width- Coefficient of Variation (RDW-CV) among geriatric patients with anemia. A majority of participants (62.8%) exhibited elevated RDW-CV values (>14.5%), indicating substantial anisocytosis. Age-related trends were observed, with the 71- 75 age group showing the highest prevalence of elevated RDW-CV (89.7%) and the highest mean value (16.11 ± 1.16%). Conversely, the 61-65 age group had the lowest proportion of elevated RDW-CV (29.4%). These age-related differences were statistically significant (p<0.001), suggesting that red cell size variability increases with age in anemic geriatric patients. Similarly, Guralnik et al. reported that anemia prevalence and complexity increase with age.[31] Interestingly, gender did not significantly influence RDW-CV distribution (p=0.819), with similar patterns observed in both males and females. Petrosyan et al. also did not report significant gender differences in their anemia etiology findings.[33]

The overall mean RDW- CV was 15.42 ± 1.52%. The variations in RDW-CV observed in elderly anemia patients are probably caused by aging-related alterations that affect the variability of red blood cell size.

Present study revealed significant nutritional deficiencies among geriatric patients with anemia. Vitamin B12 deficiency was prevalent, with 69.3% of participants showing levels below 200 pg/mL. Folate deficiency was also common, affecting 41% of participants. However, Petrosyan et al. in their study, found that 11.6% of elderly anemic patients had cobalamin deficiency, while 21% had folic acid deficiency.[33] Bhasin et al identified nutritional anemia as a prevalent cause in their study population.[29] Alwar V. et al. also noted that nutritional anemias were the most prevalent, accounting for 32.62% of cases in their elderly population.[6] Contrastingly, Raghavan NT et al. found that only 19.1% of their cases were due to nutritional anemias, predominantly iron deficiency anemia.[30] The significant nutritional deficiencies

ISSN (O): 2687-5365; ISSN (P): 2753-6556

identified among geriatric patients with anemia in the present study may stem from a combination of age-related factors impacting nutrient absorption and intake. The high prevalence of Vitamin B12 and folate deficiencies, significantly in older age groups, suggests potential age-related issues with nutrient absorption mechanisms or dietary habits. Factors such as decreased stomach acid production, changes in taste preferences, or inadequate dietary intake of essential nutrients could contribute to these deficiencies. Additionally, underlying health conditions and medication use prevalent in older adults may further hinder nutrient absorption. The age-related variations in B12 and folate levels emphasize the importance of routine screening to address deficiencies that play a crucial role in the etiology and management of anemia in geriatric populations.

Present study on geriatric patients with anemia also found that the majority (91.7%) had normal reticulocyte counts, with only a small percentage having low (7.9%) or high (0.3%) counts. While a slight decline in mean count was noted with age, from 1.13% to 0.96%, this wasn't statistically significant. Gender differences were minimal, with slightly more females (9.6%) than males (6.3%) showing low counts. These results suggest that despite anemia, most patients maintain normal reticulocyte levels, implying factors other than impaired erythropoiesis like nutritional deficiencies or chronic conditions may contribute to the anemia. Guralnik et al. noted that a significant portion of anemia in the elderly remains unexplained, which could be consistent with normal reticulocyte counts in the face of anemia.[31]

CONCLUSION

Present comprehensive study on hematological patterns of anemia in the geriatric population has provided valuable insights into the complex nature of anemia in older adults. The study, which focused primarily on individuals in their late 60s and early 70s, with a balanced gender representation, has revealed several key findings that contribute to our understanding of anemia in this age group. These insights contribute significantly to our understanding of anemia in the elderly and can aid to form more targeted and effective strategies for diagnosis, treatment, and management of anemia in this vulnerable population. Future research should focus on longitudinal studies to better understand the progression of anemia with age and the long-term impacts of various interventions in the geriatric population.

REFERENCES

1. Turner J, Parsi M, Badireddy M. Anemia. Treasure Island (FL): StatPearls Publishing; 2024 January. Available from: http://www.ncbi.nlm.nih.gov/books/NBK499994/
2. World Health Organisation (WHO). Anaemia. Available from: https://www.who.int/health-topics/anaemia
3. Singh S, Bajorek B. Defining “elderly” in clinical practice guidelines for pharmacotherapy. Pharmacy Practice. 2014 Dec;12(4):7–14.
4. Stauder R, Thein SL. Anemia in the elderly: clinical implications and new therapeutic concepts. Haematologica. 2014 Jul 1;99(7):1127–30.
5. Krishnapillai A, Omar MA, Ariaratnam S, Awaluddin S, Sooryanarayana R, Kiau HB, et al. The Prevalence of Anemia and Its Associated Factors among Older Persons: Findings from the National Health and Morbidity Survey (NHMS) 2015. IJERPH. 2022 Apr 20;19(9):4983.
6. Alwar V, Reethi K, Rameshkumar K. Geriatric Anemia: An Indian Perspective. Indian J Hematol Blood Transfus. 2013 Jun;29(2):126–7.
7. Gupta A, Ramakrishnan L, Pandey R, Sati H, Khandelwal R, Khenduja P, et al. Risk factors of anemia amongst elderly population living at high-altitude region of India. J Family Med Prim Care. 2020;9(2):673.
8. Debnath A, Rehman T, Ghosh T, Kaur A, Ahamed F. Prevalence of Anemia Among Elderly Population Residing in an Urban Area of West Bengal: A Community-Based Cross-Sectional Analytical Study. Indian Journal of Community Medicine. 2022 Dec;47(4):604.
9. ASH Foundation. Anemia and Older Adults. Available from: https://www.hematology.org/education/patients/anemia/older-adults
10. Lanier JB, Park JJ, Callahan RC. Anemia in Older Adults. afp. 2018 Oct 1;98(7):437–42.
11. Smith DL. Anemia in the Elderly. afp. 2000 Oct 1;62(7):1565–72.
12. Busti F, Campostrini N, Martinelli N, Girelli D. Iron deficiency in the elderly population, revisited in the hepcidin era. Front Pharmacol. 2014 Apr 23;5.
13. D’Angelo G. Role of hepcidin in the pathophysiology and diagnosis of anemia. Blood Res. 2013;48(1):10.
14. Barros VVD, Hase EA, Salazar CC, Igai AMK, Orsi FA, Margarido PFR. Abnormal uterine bleeding and chronic iron deficiency: Number 11 – December 2022. Rev Bras Ginecol Obstet. 2022 Dec;44(12):1161–8.
15. Valent P, Büsche G, Theurl I, Uras IZ, Germing U, Stauder R, et al. Normal and pathological erythropoiesis in adults: from gene regulation to targeted treatment concepts. Haematologica. 2018 Oct;103(10):1593–603
16. Fairfield KM, Means RT. Causes and pathophysiology of vitamin B12 and folate deficiencies. Available from: https://medilib.ir/uptodate/show/7153
17. De Las Cuevas Allende R, Díaz De Entresotos L, Conde Díez S. Anaemia of chronic diseases: Pathophysiology, diagnosis and treatment. Medicina Clínica (English Edition). 2021 Mar;156(5):235–42.
18. Alvarez-Payares JC, Rivera-Arismendy S, Ruiz-Bravo P, Sánchez-Salazar SM, Manzur RA, Ramirez-Urrea SI, et al. Unexplained Anemia in the Elderly. Cureus. 2021 Nov 28; Available from: https://www.cureus.com/articles/77707-unexplained-anemia-in-the-elderly
19. Guralnik J, Ershler W, Artz A, Lazo- Langner A, Walston J, Pahor M, et al. Unexplained anemia of aging: Etiology, health consequences, and diagnostic criteria. J American Geriatrics Society. 2022 Mar;70(3):891–9.
20. Dotson JL, Lebowicz Y. Myelodysplastic Syndrome. Treasure Island (FL): StatPearls Publishing; 2024. Available from: http://www.ncbi.nlm.nih.gov/books/NBK534126/
21. Portolés J, Martín L, Broseta JJ, Cases A. Anemia in Chronic Kidney Disease: From Pathophysiology and Current Treatments, to Future Agents. Front Med. 2021 Mar 26;8:642296.
22. Szczepanek-Parulska E, Hernik A, Ruchała M. Anemia in thyroid diseases. Polish Archives of Internal Medicine. 2017 Mar 28; Available from: http://pamw.pl/en/node/3985
23. Krishnamurthy S, Kumar B, Thangavelu S. Clinical and hematological evaluation of geriatric anemia. J Family Med Prim Care. 2022;11(6):3028
24. Reardon G, Pandya, Bailey. Falls in nursing home residents receiving pharmacotherapy for anemia. CIA. 2012 Oct;397.
25. Bień B, Bień-Barkowska K, Wojskowicz A, Kasiukiewicz A, Wojszel ZB. Prognostic factors of long-term survival in geriatric inpatients. Should we change the recommendations

ISSN (O): 2687-5365; ISSN (P): 2753-6556

for the oldest people? J Nutr Health Aging. 2015 Apr;19(4):481–8.
26. Teng Y, Teng Z, Xu S, Zhang X, Liu J, Yue Q, et al. The Analysis for Anemia Increasing Fracture Risk. Med Sci Monit. 2020 Jun 25;26.
27. Panwar B, Judd SE, Warnock DG, McClellan WM, Booth JN, Muntner P, et al. Hemoglobin Concentration and Risk of Incident Stroke in Community-Living Adults. Stroke. 2016 Aug;47(8):2017–24.
28. Bailey RA, Reardon G, Wasserman MR, McKenzie RS, Hord RS. Association of anemia with worsened activities of daily living and health-related quality of life scores derived from the Minimum Data Set in long-term care residents. Health Qual Life Outcomes. 2012 Dec;10(1):129.
29. Bhasin A, Rao MY. Characteristics of Anemia in Elderly: A Hospital Based Study in South India. Indian J Hematol Blood Transfus. 2011 Mar;27(1):26–32.
30. Raghavan Nisha T, Nair Rajan G, P H P. Evaluation of Anaemia in Patients Aged 55 Years and above in A Tertiary Care Setting in North Kerala. jemds. 2017 Jun 15;6(48):3694–7.
31. Guralnik JM, Eisenstaedt RS, Ferrucci L, Klein HG, Woodman RC. Prevalence of anemia in persons 65 years and older in the United States: evidence for a high rate of unexplained anemia. Blood. 2004 Oct 15;104(8):2263–8.
32. Singh R, Gaur BS. Pattern of anemia in geriatric patients- A hospital based prospective study. International Journal of Medical Research and Review. 2016 Jul 31;4(7):1250–4.
33. Petrosyan I, Blaison G, Andrès E, Federici L. Anaemia in the elderly: An aetiologic profile of a prospective cohort of 95 hospitalised patients. European Journal of Internal Medicine. 2012 Sep;23(6):524–8.
34. El-Shafei ASA, Mattar MMW, Ibrahim MHED, Yehia MSM. Assessment of patterns of anemia in geriatric Egyptian population. Eur. Chem. Bull. 2023, 12 (6), 2157 – 2166.

ISSN (O): 2687-5365; ISSN (P): 2753-6556