ORIGINAL ARTICLE

Anemia in Elderly Hospitalized Patients: Frequency and Association with Comorbidities

Shamaila Burney[1], Muhammad Farooq [2], Ahsan Ahmad Alvi[3]

ABSTRACT

Objective: To determine the type and severity of anemia in elderly hospitalized patients and their association with comorbidities.

Study Design: Descriptive study.

Place and Duration of Study: Medical Department of Pakistan Railways Hospital from October 2015 to September 2016.

Materials and Methods: One hundred elderly patients admitted in the Medical Ward of Pakistan Railways Hospital were selected by non- probability convenient sampling. We investigated the frequency of anemia in these patients and its relationship to common comorbidities in this age group such as hypertension, diabetes, heart disease and chronic kidney disease etc. Anemia was defined according to the World Health Organization (WHO) criteria: Hemoglobin <13 g/dL in males and <12 g/dL in females. The patients were classified according to the severity of anemia as well as morphological type of anemia based on hemoglobin level, blood cell indices and peripheral film Three grades of anemia were differentiated as per WHO criteria: mild (hemoglobin between 11g/dl and lower limit of normal), moderate (hemoglobin between 8 g/dl and 10.9 g/dl), and severe (hemoglobin <8g/dl). Microcytic anemia was defined as mean corpuscular volume (MCV) below 77 fl, normocytic as MCV between 77 fl and 96 fl, and macrocytic by an MCV above 96 fl. Data analysis was done on the basis of symptomatology and routine laboratory parameters done on hospital admission.

Results: Out of the 100 patients studied, 63% were found to be anemic. The frequency of mild, moderate and severe anemia was 57%, 30% & 12% respectively. Normocytic normochromic anemia was the predominant morphological type seen in 61.9 % patients. Nearly half (49%) of the anemic patients had 3 or more comorbidities as compared to 21% non- anemic patients and the correlation was statistically significant at 0.01 level (p value 0.009). Chronic kidney disease was thrice as common in anemic patients and had a significant association with anemia.

Conclusion: Anemia is a frequent occurrence in hospitalized geriatric patients and is directly related to the number of comorbidities. Early diagnosis and management of anemia can have a significant impact on the overall disease outcome in elderly patients and should be part of a comprehensive geriatric assessment.

Key Words: *Anemia, Elderly, Geriatric, Hospitalized, Co morbidities*.

Introduction

The geriatric population is expected to show an alarming rise by the end of 21st century posing fresh challenges to the health care provider and putting additional constraints on meager health resources. Elderly are a neglected population in Pakistan health care system and geriatric medicine is still not practiced as a distinct specialty. With advancing age, the frequency of chronic diseases and psychological ailments increases. Anemia is a frequently encountered problem in geriatric practice world over and has rightly been called "an emerging problem for the 21st century."[1]

The mean prevalence of anemia in elderly ranges from 12% in the community to 40% in hospitalized patients.[2,3] Anemia in older patients is often mild and asymptomatic but it is associated with many adverse outcomes such as cognitive decline, dementia, depression, functional deterioration and frequent incidence of falls.[3,5] It is also an independent

[1,2]Department of Medicine/[3]Pathology
Islamic International Medical College
Riphah International University, Islamabad

Correspondence:
Dr. Shamaila Burney
Assistant Professor
Department of Medicine
Islamic International Medical College
Riphah International University, Islamabad
E-mail: shamaila.burney@riphah.edu.pk

Funding Source: NIL; Conflict of Interest: NIL
Received: March 28, 2018; Revised: November 22, 2018
Accepted: December 21, 2018

predictor of mortality as concluded by Leiden 85 study.[6] There has been a growing interest in the recent few years to unfold the association between anemia and various comorbidities found in this age group. There is now sufficient evidence to suggest that anemia has a negative impact on the outcome of diseases like diabetes and hypertension.[7,8] A study conducted by Nathavitharana et al has suggested that presence of anemia in hospitalized elderly patients is associated with more frequent readmissions, longer hospital stay, and adverse outcomes in terms of morbidity and mortality.[9] More recently, Abrahamsen et al concluded that more elderly patients with explained anemia died or were readmitted after one year of acute hospitalization as compared to their non-anemic counterparts or those with unexplained anemia.[10] This highlights the significance of early diagnosis and treatment of correctable causes of anemia such as nutritional anemia in this vulnerable age group.

Despite such conclusive evidence, there is a dearth of information regarding prevalence of anemia in our geriatric population and its clinical impact. Present study was conducted to determine the type and severity of anemia in elderly hospitalized patients and their association with comorbidities.

Materials and Methods

This descriptive study was conducted in the Medical Department of Pakistan Railways Hospital from October 2015 to September 2016. A total of 100 hospitalized elderly patients (65 years and above), both male and female were selected by non-consecutive convenient sampling. Sixty-five years age was used as a cutoff point which is widely accepted and utilized in previous studies. The study was initiated after the approval of study proposal by the Institutional Ethical Committee. Informed consent from all participants was obtained. Patients with malignancy, critical illness/those requiring ICU admission, unstable congestive cardiac failure, decompensated liver disease, congenital hemoglobinopathies, history of recent surgery or blood transfusion and those on anti-anemic treatment were excluded. Data analysis was done on the basis of detailed history, medical records, and routine laboratory parameters done on hospital admission. Complete blood counts were generated through Sysmex XP-100 hematology analyzer with routine quality control. Peripheral blood films were examined by consultant hematologist after staining with Leishman's stain. Urinalysis, fasting blood sugar, renal function tests (serum urea and creatinine), electrolytes (serum sodium and potassium), liver function tests (serum bilirubin, alanine transaminase, alkaline phosphatase), and electrocardiogram (ECG) were performed as part of admission protocol. We used the same reference ranges for various tests as established by our laboratory.

Anemia was defined according to the World Health Organization (WHO) criteria: Hemoglobin <13 g/dL in males and <12 g/dL in females.[11] The patients were classified according to the severity of anemia as well as morphological type of anemia based on hemoglobin level, blood cell indices and peripheral film . Three grades of anemia were differentiated as per WHO criteria: mild (hemoglobin between 11g/dl and lower limit of normal), moderate (hemoglobin between 8 g/dl and 10.9 g/dl), and severe (hemoglobin <8g/dl). [11] Based on data from literature and reference values for hemoglobin level, hematocrit, total red blood cell count, blood cell indices and peripheral smear, anemia was classified as microcytic (<77 fl), normocytic (77–96 fl), or macrocytic (>96 fl). [12]

Data was analyzed using IBM SPSS 21. Categorical data was calculated as frequencies and percentages. Comparison of study variables was performed by Chi-square test. P-value of less than 0.05 was considered significant at 95% confidence interval.

Results

A total of 100 hospitalized patients > 65 years of age were included after meeting inclusion & exclusion criteria. Of these, 53 were male and 47 were female patients. According to WHO classification, 63 (63%) patients were found to be anemic. Females showed a higher incidence of anemia (70.2% vs. 56.6%) but the gender difference was not statistically significant. Amongst 65-69 years age group, 60.4% (29/48) patients, in 70-79 years, 60.5% (23/38) and in patients 80 years above, frequency of anemia was 78.5% (11/14). No statistically significant association was found between patient's age & hemoglobin levels although the prevalence of anemia increased with rising age. There was no association between age and severity of anemia. In majority of the

patients (36/63 or 57%) anemia was mild. Figure 1 shows frequency of mild, moderate and severe anemia in our study.

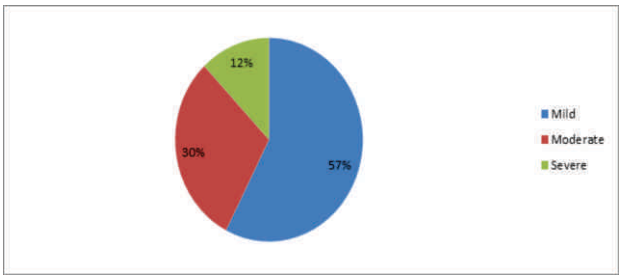

Fig 1: Frequency of Anemia According to Severity

Normocytic normochromic anemia was the dominant morphological pattern seen in 61.9% (39/63) patients. Figure 2 shows distribution of anemia according to morphological pattern.

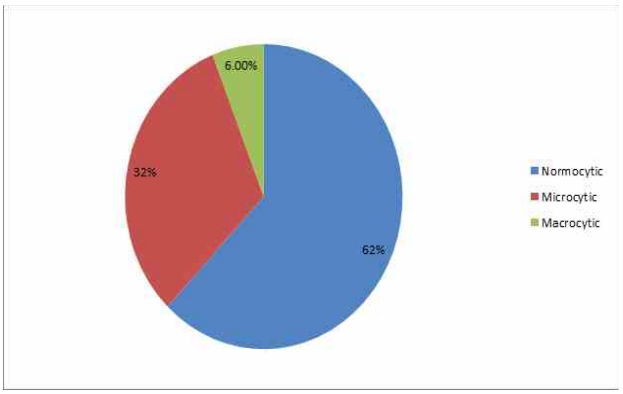

Fig 2: Distribution of Anemia According to Morphology

All patients were evaluated for comorbidities common for this age group. These included diabetes, hypertension, chronic kidney disease, heart disease, stroke, obstructive airway disease, rheumatological disorders, chronic liver disease & infections. Hypertension, diabetes, heart disease and chronic kidney disease were the most common diseases seen in this study. All these conditions were more frequently seen in anemic rather than non-anemic patients (table I). The association between anemia and chronic kidney disease was also statistically significant. (p value < 0.01) When comparing anemic and non- anemic patients in terms of number of comorbidities in a single patient, anemic patients had a higher number of comorbidities. Nearly half (31/63 or 49%) of the anemic patients had 3 or more comorbidities as compared to 21% (8/37) non-anemic patients and the correlation was statistically significant at 0.01 level (p value 0.009).

Table I: Common Comorbidities in Non-anemic and Anemic Patients

Comorbidity	Non-anemic patients (%)	Anemic patients (%)
Hypertension	29.7	42.2
Diabetes	35.1	44.4
Heart disease	32.4	34.9
CKD	10.8	42.8
Infections	37.8	28.5
COPD	18.9	15.8
CLD	16.2	11.0
Arthritis	10.8	9.5

Discussion

The results of our study confirm a high prevalence (63%) of anemia in our geriatric hospitalized patients. Majority of the patients had a mild normocytic normochromic anemia. Presence of anemia in a single patient was significantly correlated with number of comorbidities mainly diabetes, hypertension, heart disease and chronic kidney disease. Frequency of anemia in the present study was higher than the frequency reported in community-dwelling adults, but is in agreement with the data reported from nursing home residents and hospitalized patients.[2,3] Bach et al. while analyzing data from a large European university hospital cohort reported frequency of anemia as 21.1 %. [13] Another observational cohort study found the prevalence of anemia 48%. [14] The highest frequency of anemia in geriatric patients was determined by Giesel et al in a retrospective hospital based study in which 63.3% of their elderly patients were found to be anemic.[15] Results of our study therefore, are in accordance with Geisel et al.

Literature review suggests that anemia is significantly correlated with advanced age and male sex.[13] The percentage rises with age and is reported as high as 50% in individuals 80 years and above.[16,17] Results of our study also show that anemia increases with advancing age as 78.8% of our patients >80 years of age were anemic. However, female patients in our study were found to be more frequently anemic than their male counterparts (70.2% vs. 56.6%). A simple explanation of this is the fact that women in developing parts of the world are inherently at a greater risk of anemia due to socioeconomic, cultural and biological factors with low body iron stores resulting from early marriages, multiple pregnancies etc.

Worldwide the dominant morphological pattern of

anemia reported is normocytic normochromic with majority of the elderly population having only a mild anemia.[13,17] More than half (57%) of our study population had mild anemia, however an equally large number of patients had moderate (30%) or severe (12%) anemia. It may be argued that this was due to the fact that ours was a hospital based study, however in comparison to previous hospital based studies these figures were still alarmingly high.[13,15] Type and severity of anemia can be a useful predictor of in-hospital and post discharge mortality. In a most recent study, Riva et al [18] concluded that even mild anemia was a significant predictor of hospital re-admission in older patients and the 3 month mortality risk was directly proportional to the severity of anemia. The study results further showed that normocytic normochromic anemia was associated with worst prognosis irrespective of severity. This is understandable, as prevalence of serious illnesses like diabetes, hypertension, heart disease etc. all increase with age resulting in anemia of chronic disease which is the major cause of normocytic normochromic anemia. Predominant morphological pattern of anemia in our study was also normocytic normochromic (61.9%) which is in keeping with previous studies.[13,17] However, in contrast to Western studies, frequency of microcytic anemia in our study population was quite high (31.7%) with almost every third patient having microcytic hypochromic anemia. This is a significant finding keeping in view that the most common cause of microcytic anemia is iron deficiency which is a readily correctable cause of anemia. Vitamin B12 and folate deficiency are also correctable causes of anemia and are a common cause of macrocytic anemia in developing countries like Pakistan.[19] In the present study, 6.3% of our patients had macrocytic anemia. In a previous study, we have reported frequency of vitamin B12 and folate deficiency as 10% and 7% respectively.[20] Prevalence of nutritional anemia in the developing world is high. The National Health and Nutrition Examination Survey (NHANES III), also reports that one-third of the elderly anemic patients have nutritional anemia mainly iron deficiency.[16] Anemia in elderly is often complicated by the fact that majority of these patients have nutritional anemia in the background of anemia of chronic disease. It may not always be possible to treat the underlying disorder however, correction of coexisting nutritional anemia such as iron deficiency can significantly influence the outcome in many diseases such as chronic kidney disease and heart failure.[21,22]

One of the most significant aspects of our study was that it highlights the association between anemia and presence of comorbidities in a patient. In a recently published study, Migone et al have concluded that anemia is independently associated with higher number of comorbidities in a single patient.[14] This can have important therapeutic implications as untreated anemia is known to negatively affect outcomes in terms of primary illness such as diabetes,[7] hypertension,[8] heart failure,[22] chronic obstructive pulmonary disease,[23] etc.[14,24] While the prevalence of all these diseases was overall high in our study population, the frequency of most of these disorders was much higher in anemic patients. Chronic kidney disease was thrice as common in anemic patients and had a significant association with anemia. Correction of anemia in chronic kidney disease is an integral part of management of patients with renal disease.[21] The association between anemia and chronic kidney disease is well known and renal disease should be excluded in every elderly individual with unexplained anemia. In terms of number of comorbidities in a single patient, more than half of our anemic patients had at least 3 or higher number of comorbidities as compared to their non-anemic counterparts (49% vs. 21%). The correlation between presence of anemia and number of comorbidities per single patient was statistically significant (p value < 0.01).

The present study was not aimed to determine the etiology of anemia therefore the data is based only on previously diagnosed coexisting diseases in our patients which may be considered as a limitation of the study. It may be argued that primary illness of an individual patient can act as confounder, affecting presence or severity of anemia. However, we applied stringent exclusion criteria and an attempt was made to include only stable patients admitted in general medical ward with diseases common in this age group. Furthermore, the exact causal link between anemia and different comorbidities needs to be evaluated.

The disease burden in Pakistani geriatric population

is very high with diabetes, hypertension and arthritis as the most common illnesses.[25] Anemia often remains under diagnosed because of vague signs and symptoms which are generally attributed to co existing illnesses or simply old age. Given the clear association between even mild anemia and morbidity in this age group, findings of our study may have clinical significance in the management of elderly patients with anemia. More studies to explore various aspects of clinical impact of anemia are needed to further evaluate this important aspect of geriatric health.

Conclusion

The present study has shown that every second hospitalized elderly patient in our set ups is likely to be anemic with every third patient having moderate to severe anemia. It has further shown that frequency of common diseases such as diabetes and hypertension is higher in patients with anemia and that presence of anemia is directly related to number of comorbidities in a single patient. We conclude that physicians should have a high index of suspicion and low threshold for treating anemia in geriatric patients as this can significantly impact the disease outcome.

REFERENCES

1. Vanasse GJ, Berliner N. Anaemia in elderly patients: An emerging problem for the 21st century. Hematology Am Soc Hematol Educ Program. 2010; 2010:271-5.
2. Gaskell H, Derry S, Moore RA, Mc Quay HJ. Prevalence of anaemia in older persons: systematic review. BMC Geriatr. 2008; 8:1.
3. Patel KV, Guralnik JM. Prognostic implications of anaemia in older adults. Haematologica. 2009; 94(1):1-2.
4. AndroM, Le Squere P, Estivin S, Gentric A. Anaemia and cognitive performances in the elderly: a systematic review. Eur J Neurol.2013; 20(9):1234-40.
5. Bowling CB, Muntner P, Bradbury BD, Kilpatrick RD, Isitt JJ, Warriner AH, et al. Low hemoglobin levels and recurrent falls in U.S. men and women: prospective findings from the REasons for Geographic And Racial Differences in Stroke (REGARDS) cohort. Am J Med Sci. 2013; 345(6):446-54.
6. Den Elzen WP, Willems JM, Westendorp RG, de Craen AJ, Assendelft WJ, Gussekloo J. Effect of anemia and comorbidity on functional status and mortality in old age: results from the Leiden 85-plus-Study. CMAJ 2009; 181(3-4):151-7.
7. Wu F, Jing Y, Tang X, Li D, Gong L, Zhao H, et al. Anemia: an independent risk factor of diabetic peripheral neuropathy in type 2 diabetic patients. Acta Diabetol. 2017; 54(10):925-31.
8. Paul B, Wilfred NC, Woodman R, Depasquale C. Prevalence and correlates of anaemia in essential hypertension. Clin Exp Pharmacol Physiol. 2008; 35(12):1461-4.
9. Nathavitharana R, Murray JA, Dsousa N, Sheehan T, Frampton C, Baker BW, et al. Anaemia is highly prevalent among unselected internal medicine inpatients and is associated with increased mortality, earlier readmission and more prolonged hospital stay: an observational retrospective cohort study. Intern Med J. 2012; 42(6):683–91.
10. Abrahamsen JF, Monsen AL, Landi F, Haugland C, Nilsen RM, Ranhoff AH. Readmission and mortality one year after acute hospitalization in older patients with explained and unexplained anemia - a prospective observational cohort study. BMC Geriatr. 2016; 16:109.
11. Hemoglobin concentrations for the diagnosis of anemia and assessment of severity. Geneva, Switzerland: World Health Organization; [internet] 2011. [Cited 12 January 2015]. Available from: http://www.who.int/vmnis/indicators/hemoglobin.pdf.
12. Brugnara C, Mohandas N. Red cell indices in classification and treatment of anemias: from M.M. Wintrobes's original 1934 classification to the third millennium. Curr Opin Hematol. 2013; 20(3):222–223.
13. Bach V, Schruckmayer G, Sam I, Kemmler G, Stauder R. Prevalence and possible causes of anemia in the elderly: a cross-sectional analysis of a large European university hospital cohort. Clin Interv Aging. 2014; 9:1187-96.
14. Migone De Amicis M, Poggiali E, Motta I, Minonzio F, Fabio G, Hu C, et al. Anemia in elderly hospitalized patients: prevalence and clinical impact. Intern Emerg Med. 2015; 10(5):581-6.
15. Geisel T, Martin J, Schulze B, Schaefer R, Bach M, Virgin G, et al. An etiologic profile of anemia in 405 geriatric patients. Anemia. 2014; 2014:932486.
16. Guralnik JM, Eisenstaedt RS, Ferruci L, Klein HG, Woodman RC. Prevalence of anaemia in persons 65 years and older in the United States: evidence for a high rate of unexplained anaemia. Blood. 2004; 104(8):2263-8.
17. Tettamanti M, Lucca U, Gandini F, Recchia A, Mosconi P, Apolone G, et al. Prevalence, incidence and type of mild anemia in the elderly: the “Health and Anemia” population-based study. Haematologica. 2010; 95(11):1849-56.
18. Riva E, Colombo R, Moreo G, Mandelli S, Franchi C, Pasina L, et al; REPOSI Investigators.Prognosticvalue of degree and types of anaemia on clinical outcomes for hospitalised older patients.Arch Gerontol Geriatr. 2017; 69:21-30.
19. Iqbal SP, Kakepoto GN, Iqbal SP. Vitamin B12 deficiency- a major cause of megaloblastic anemia in patients attending a tertiary care hospital. J Ayub Med Coll Abbottabad. 2009; 21(3):92-4.
20. Burney S, Ahmed SQ, Masroor R. Anaemia in elderly: A benign condition or an early warning? - A hospital based study. Pak Armed Forces Med J 2016; 66(3):400-06
21. Macdougall IC, Bock AH, Carrera F, Eckardt KU, Gaillard C, Van Wyck D, et al; FIND-CKD Study Investigators. FIND-CKD: a randomized trial of intravenous ferric carboxymaltose versus oral iron in patients with chronic kidney disease and iron deficiency anaemia. Nephrol Dial Transplant. 2014;

29(11):2075-84.

22. Cohen-Solal A, Leclercq C, Deary G, Lasocki S, Zambrowski JJ, Mebazaa A et al. Iron deficiency: an emerging therapeutic target in heart failure. Heart. 2014 Sep 15; 100(18):1414-20.
23. Oh YM, Park JH, Kim EK, Hwang SC, Kim HJ, Kang DR, et al. Anemia as a clinical marker of stable chronic obstructive pulmonary disease in the Korean obstructive lung disease cohort.J Thorac Dis. 2017; 9(12):5008-5016.
24. Ali AN, Athavale NV, Abdelhafiz AH. Anemia: An Independent Predictor of Adverse Outcomes In Older Patients With Atrial Fibrillation. J Atr Fibrillation. 2016; 8(6):1366.
25. Zafar SN, Ganatra HA, Tehseen S, Qidwai W. Health and needs assessment of geriatric patients: results of a survey at a teaching hospital in Karachi. J Pak Med Assoc. 2006; 56(10):470-4.