



Original Article

Evaluation of anemia as comorbidity in elderly subjects aged 65 years and above admitted to hospital for other medical problems

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ABSTRACT

Objectives: The objectives of this study were as follows: (1) To find out the proportion of anemia in the elderly aged 65 years and above admitted to hospital for other medical problems. (2) To determine the association between sociodemographic variables, other comorbidities, and anemia in the elderly aged 65 years and above.

Material and Methods: Hospital-based analytical cross-sectional study was done. This study was conducted for period of one year among 236 geriatric patients who were admitted for other medical disorders and they were evaluated for anemia. Patients with hemoglobin cutoff value <13% g for men and <12% g for women were considered for further evaluation of anemia (using clinical and biochemical evaluation). Ethical principals were adhered. Data were analyzed using the Statistical Package for the Social Sciences Software version 23.0.

Results: Among the 236 elderly patients, recruited in the study, 65.3% were anemic. About 75.8% had at least one comorbidity such as coronary artery disease, chronic respiratory illness, renal diseases, arthritis, liver diseases, gastrointestinal diseases, cardiovascular accidents, carcinomas, diabetes, and hypertension. All these comorbidities except diabetes and hypertension had shown to be significantly associated with anemic status of the elderly patients.

Conclusion: This study concludes that, anemia was highly prevalent among hospitalized elderly patients and it is highly associated with other comorbid conditions.

Keywords: Anemia, Elderly, Hemoglobin, Comorbidities

INTRODUCTION

Anemia in the elderly is an emerging problem that is associated with poor health-related quality of life, decreased cognition and functional ability, increased risk of fall, infections, and increased morbidity and mortality regardless of the underlying cause of low hemoglobin (Hb).^[1] However, many physicians continue to neglect the significance of anemia as a serious clinical condition in the elderly, while decreased Hb was previously largely considered as a normal consequence of aging. There is now evidence that anemia has a substantial negative impact on previously

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existing comorbidities, signifies an underlying disease, and is associated with poor clinical outcome, which adversely affects morbidity and mortality. Hence, anemia is recognized as a significant and independent contributor to morbidity, mortality, and frailty in the elderly patients regardless of the underlying causes.^[1] Failure to evaluate geriatric anemia can result in delayed diagnosis of an easily treatable condition and increased chance of hospital readmission rate and increased mortality up to 1 year after hospitalization.^[2] There has been a progressive statistical increase in the number of elderly in recent years; thus, anemia in the elderly patients is an emerging global health problem and requires allocation of health-care resources.^[3]

Aging by itself is unlikely to cause anemia, but changes that occur commonly during aging increases the risk of anemia, thus explaining the association of anemia with old age. These include (a) poor nutrition, (b) reduced ability to absorb essential nutrients, (c) decreased reserve of hematopoietic factors, (d) reduced erythropoiesis, (e) increased frequency of inflammatory process, and (f) gastrointestinal loss of blood.^[4] These factors make the elderly more prone to developing anemia and micronutrient deficiencies which affect erythropoiesis. Rectification of any of these abnormalities contributes significantly to overall improved outcome with respect to physiological parameters as well as quality of life.^[5]

According to Hb cutoff levels defined by the World Health Organization, Hb <12 g/dL for females and Hb <13 g/dL for males is defined as anemia. The third National Health and Nutrition Examination Survey (NHANES) (1988–1994) (NHANES III), overall, 11.0% of men and 10.2% of women aged 65 and older were anemic and the prevalence of anemia was >20% among those aged 85 and older.^[4] Anemia is an independent predictor of poor outcomes with many diseases, especially in the elderly. Despite the high prevalence of anemia in elderly and its impact on their quality of life, very few studies have examined the effect of anemia in elderly patients in India. Hence, this study is undertaken with the following objectives.

1. To find out the proportion of anemia in the elderly aged 65 years and above admitted to hospital for other medical problems.
2. To determine the association between sociodemographic variables, other comorbidities, and anemia in the elderly aged 65 years and above.

MATERIAL AND METHODS

This present hospital-based analytical cross-sectional study was conducted by Departments of General Medicine and Allied Specialties at Malabar Medical College Hospital and Research Centre, Calicut. The study was conducted for period of 1 year in patients admitted with other medical

disorders who are aged 65 years and above and they were evaluated for anemia.

Sample size and sampling

To estimate an appropriate sample size, the following formula was used $n = 4 PQ/d^2$. Taking 95% confidence interval, population percentage of the incidence is 68.5% (68.5% in southern India, a study done by Shrivastava *et al.*),^[6] $P = 0.685$, $Q = 1 - P$ which comes out to be 0.315, taking allowable error of 10% of the prevalence = 6.85, the sample size comes out to be $n = 184$. Considering 25% non-response rate, the sample size was calculated to be 230. All patients admitted for other medical problems in medicine ward during the study period of 1 year were included in the study. We were able to collect and investigate 236 participants. The participants were consecutively selected based on the following inclusion and exclusion criteria.

Inclusion criteria

The following criteria were included in the study:

1. Above 65 years age, who are admitted at Malabar Medical College and Hospital for other medical problems, who gave consent to participate in the study.
2. Patients with Hb cutoff value <13 g% for men, <12 g% for women were considered for further evaluation of anemia.

Exclusion criteria

The following criteria were excluded from the study:

1. Elderly who did not consent to the study
2. Patient on iron and folic acid therapy
3. Patient received blood transfusion in the past 1 month
4. Already diagnosed and evaluated cases of anemia on treatment.

Data collection

After obtaining Institutional ethical clearance from Malabar Medical College Hospital and Research Centre, Calicut (EC-175) and written informed consent, the data were collected using pretested semi-structured questionnaire which comprised sociodemographic details, clinical examination, reports of blood, urine, stool investigations, X-ray, and bone marrow examination. Apart from general physical examination, the following biochemical investigation was performed as per standard guidelines: Complete blood count with peripheral smear and reticulocyte count, renal function test (blood urea and serum creatinine), blood glucose, chest X-ray PA view, urine and stool examination (occult blood loss and microscope), direct coombs test, iron studies (serum ferritin, total iron binding capacity (TIBC), and serum iron), and liver function test. If needed bone marrow examination (aspiration/trephination biopsy) was also performed in

patients who had suspicion of malignancy, abnormal peripheral smear, unexplained anemia, Hb electrophoresis (to suspect multiple myeloma, sickle cell disease, and thalassemia), sickling test, osmotic fragility test, indirect coombs test (hemolysis suspected), and serum B12/folate assay (peripheral smear showing macrocytic picture).

Statistical analysis of data

All the data were entered into Microsoft excel 2010 and were analyzed using the Statistical Package for the Social Sciences Software version 23.0. Discrete variables were presented as frequency and percentage and continuous variables as mean and standard deviation. "Chi-square" test was used to find out the association between sociodemographic variables, chronic morbidities, and anemic status of elderly patients. $P < 0.05$ was fixed as significant level.

RESULTS

Among 236 elderly patients, recruited in the study, 154 (65.3%) were anemic and the remaining 82 (34.7%) were not anemic [Figure 1]. There was no significant association between age and gender of the elderly patients and their anemia status [Table 1].

Out of 236 study subjects in this study, 179 patients (75.8%) had at least one comorbidities such as coronary artery disease

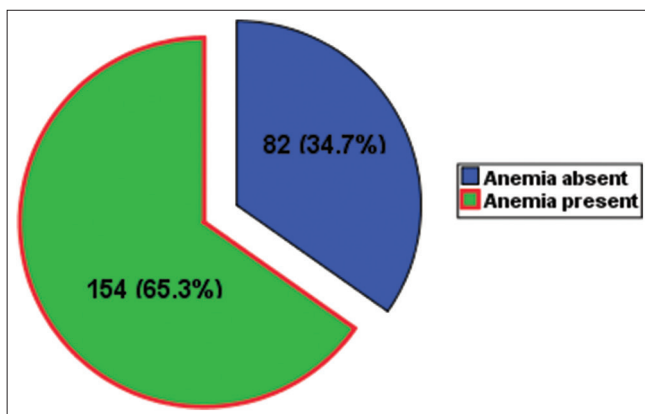


Figure 1: Anemia status in elderly patients ($n = 236$).

(CAD), chronic respiratory illness, renal diseases, arthritis, liver diseases, gastrointestinal diseases, cardiovascular accidents, carcinomas, diabetes, and hypertension. All these comorbidities except diabetes and hypertension had shown to be significantly associated with anemic status of the elderly patients [Table 2].

DISCUSSION

Anemia is a significant health problem in elderly patients requiring hospitalization due to its impact on the clinical outcome of the individual. Anemia is highly prevalent in elderly population, which is often overlooked due to coexisting multiple comorbidities in the elderly. In elderly patients, determining the underlying etiology is difficult due to multiple comorbidity.^[7] This is an important shortfall because even mild anemia can compromise a patient's well-being and survival, regardless of the underlying cause.^[8] Since anemia is associated with significant morbidity, mortality, and frailty in hospitalized geriatric population, understanding the association between the various comorbidities and anemia is crucial for active intervention to reduce morbidity and mortality and to improve the survival and quality of life in the elderly age group. Hence, this study is undertaken to know the prevalence of anemia among elderly patients and its association with other comorbidities.

Among 236 study subjects, 154 (65.3%) patients were found to be anemic. A study done by Steensma and Tefferi^[8] among elderly patients in prospective study at France showed similar results, whereas another study done by Guralnik *et al.*^[4] and Tettamanti *et al.*^[9] among elderly subjects showed a low prevalence of anemia in elderly patients. This variation may be due to the fact difference in the study settings at hospitals in comparison with the community-based studies among elderly.^[10]

Among 236 study subjects in this study, 179 patients (75.8%) had comorbidities such as CAD, chronic respiratory infection, renal disease, arthritis, liver disorders, gastrointestinal disorders, cerebrovascular accidents, and carcinoma. These comorbidities were statistically associated with anemia in the study subjects ($P < 0.05$). This finding insists on screening for these comorbidities in elderly patients presenting with

Table 1: Association between sociodemographic variables and anemia in the elderly patients aged ≥ 65 years ($n=236$).

Sociodemographic variables	Total no. of patients n (%)	Anemia status		Chi-square value	P-value
		Present n (%)	Absent n (%)		
Age (in years)					
65–74 (Early elderly)	133 (56.4)	84 (63.2)	49 (36.8)	0.591	0.44
>75 (Late elderly)	103 (43.6)	70 (68.0)	33 (32.0)		
Gender					
Male	127 (53.8)	85 (66.9)	42 (33.1)	0.340	0.56
Female	109 (46.2)	69 (63.3)	40 (36.7)		

Table 2: Association between anemia and other comorbidities in the elderly aged ≥65 years.

Comorbidities	n (%)	Anemia status		Chi-square value	P-value
		Present n (%)	Absent n (%)		
Coronary artery disease					
Present	62 (26.3)	32 (51.6)	30 (48.4)	6.902	0.009*
Absent	174 (73.7)	122 (70.1)	52 (29.9)		
Chronic respiratory infection					
Present	63 (26.7)	26 (41.3)	37 (58.7)	21.805	<0.001*
Absent	173 (73.3)	128 (74.0)	45 (26.0)		
Renal diseases					
Present	61 (25.8)	26 (42.6)	35 (57.4)	18.583	<0.001*
Absent	175 (74.2)	128 (73.1)	47 (26.9)		
Arthritis					
Present	49 (20.8)	20 (40.8)	29 (59.2)	16.289	<0.001*
Absent	187 (79.2)	134 (71.7)	53 (28.3)		
Liver diseases					
Present	48 (20.3)	17 (35.4)	31 (64.6)	23.660	<0.001*
Absent	188 (79.7)	137 (72.9)	51 (27.2)		
Gastrointestinal disorders					
Present	46 (19.5)	16 (34.8)	30 (65.2)	23.399	<0.001*
Absent	190 (80.5)	138 (72.6)	52 (27.4)		
Cardiovascular accidents					
Present	40 (16.9)	11 (27.5)	29 (72.5)	30.279	<0.001*
Absent	196 (83.1)	143 (73.0)	53 (27.0)		
Carcinoma					
Present	17 (7.2)	5 (29.4)	12 (70.6)	10.380	0.001*
Absent	219 (92.8)	149 (68.0)	70 (32.0)		
Diabetes mellitus					
Present	85 (36.0)	54 (63.5)	31 (36.5)	0.174	0.676
Absent	151 (64.0)	100 (66.2)	51 (33.8)		
Hypertension					
Present	101 (42.8)	69 (68.3)	32 (31.6)	0.730	0.393
Absent	135 (57.2)	85 (63.0)	50 (37.0)		

*P<0.05

anemia and vice versa screening for anemia among those presenting with other comorbidities.

In the present study, out of 236 participants, 26 patients (11%) had chronic renal failure with anemia. Similar results were shown in the study by Chaves *et al.*, revealed that 13.2% of patients had anemia due to chronic renal failure.^[11] Anemia due to chronic renal disease has impact on mortality and prolonged hospitalization.^[12] Anemia is due to reduced erythropoietin production. A serum creatinine clearance <60 mL/min is a known risk factor for anemia. Non-steroidal anti-inflammatory drugs (NSAIDs) and anti-platelet drugs are known risk factor for elderly anemia.^[13] The findings of the present study substantiated the above mentioned statement by showing that comorbidities such as chronic arthritis (NSAID use) and cardiovascular disease/CAD (anti-platelet drugs use) were significantly associated with anemia in elderly patients.

In the present study, of the total 85 diabetes patients, 54 patients (63.5%) were anemic. The present study does not

show any association between diabetes and anemia status of elderly patients. Although there is no statistically significant association between diabetes and anemia, due to high prevalence of anemia among diabetic patients, it shows the importance of screening all diabetes patients at ward setting for anemia.

Malignancies, particularly hematological malignancies, due to their nature of destruction of blood cells are commonly associated with anemia. Out of 17 cancer patients, 5 (4 with hematological malignancy) patients presented with anemia. This finding is not concurrent with the study done by Prakash *et al.*^[14] who revealed that 18% of the cases had hematological malignancy. The prevalence of hematological malignancy could have been higher, if bone marrow examination had been done in all 154 anemic patients. A study done by Ludwig^[15] showed that anemia (63%) is the most common presentation in patients with underlying hematological malignancy.

Very few studies have examined the effect of anemia in elderly patients in India. It is hospital-based cross-sectional study, temporarily cannot be maintained.

The study findings cannot be generalized due to smaller sample size.

CONCLUSION

This study concludes that, anemia was highly prevalent among hospitalized elderly patients and it is highly associated with other comorbid conditions. Hence, all elderly patients admitted for other comorbid illness needs to be screened for anemia and those who were found to be anemic should be initiated on appropriate treatment for anemia. Vice versa, all anemic elderly patients should be evaluated for underlying chronic morbidities.

Ethical approval

The study obtained Institutional Ethical Clearance at Malabar Medical College Hospital and Research Centre, Calicut (EC-175).

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

Dr. Reena Mohan is on the Editorial Board of the Journal.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

REFERENCES

1. Vanasse GJ, Berliner N. Anemia in elderly patients: An emerging problem for the 21st century. *Hematology Am Soc Hematol Educ Program* 2010;2010:271-4.
2. Penninx BW, Pahor M, Woodman RC, Guralnik JM.

Anemia in old age is associated with increased mortality and hospitalization. *J Gerontol A Biol Sci Med Sci* 2006;61:474-9.

3. Olivares M, Hertrampf E, Capurro MT, Wegner D. Prevalence of anemia in elderly subjects living at home: Role of micronutrient deficiency and inflammation. *Eur J Clin Nutr* 2000;54:834-9.
4. Guralnik JM, Eisenstaedt RS, Ferrucci L, Klein KG, Woodman RC. Prevalence of anemia in persons 65 years and older adults. *Blood* 2004;104:2263-8.
5. Penninx BW, Guralnik JM, Onder G, Ferrucci L, Wallace RB, Pahor M. Anemia and decline in physical performance among older persons. *Am J Med* 2003;115:104-10.
6. Shrivastava SR, Hippargi SB, Ambali AP, Yelikar BR. Patterns of anemia in geriatric age group. *JKIMSU* 2013;2:77-81.
7. World Health Organization. Nutritional anemia: Report of a WHO scientific group. Technical report series no 405. Geneva: World Health Organization; 1968. p. 1-40. Available from: <https://apps.who.int/iris/handle/10665/40707> [Last accessed on 2022 Jul 12].
8. Steensma DP, Tefferi A. Anemia in the elderly: How should we define it, when does it matter and which can be done. *Mayo Clin Proc* 2007;82:958-66.
9. Tettamanti M, Lucca U, Gandhini F, Recchia A, Mosconi P, Apolane G, *et al.* Prevalence, incidence and types of mild anemia in the elderly; the Health and anemia population-based study. *Haematologica* 2010;95:1849-56.
10. Inelmen EM, D'Alessio M, Gatto MR, Baggio MB, Jimenez G, Bizzotto MG, *et al.* Descriptive analysis of the prevalence of anemia in a randomly selected sample of elderly people living at home: Some results of an Italian multicentric study. *Aging (Milano)* 1994;6:81-9.
11. Chaves PH, Ashar B, Guralnik JM, Fried LP. Looking at relationship between hemoglobin concentration and prevalent mobility difficulty in older women. *J Am Geriatr Soc* 2002;50:1257-64.
12. Tay MR, Ong YY. Prevalence and risk factors of anaemia in older hospitalized patients. *Singapore Healthc* 2011;20:71-9.
13. Joshi V, Gupta MK, Dhar HL. Anemia in elderly: Correlation with diet and diseases. *Bombay Hosp J* 2011;53:176-80.
14. Prakash KG, Devendrappa KR, Madhukumar MH, Priyashree R, Avinash BH. Clinical profile of anemia in elderly: A cross sectional study from a tertiary care centre. *Sch J App Med Sci* 2015;3:1266-70.
15. Ludwig H. Anemia of hematologic malignancies: What are the treatment options. *Semin Oncol* 2002;29(3 Suppl 8):45-54.

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