

Original research article**A cross-sectional study on evaluation of anemia in elderly in a tertiary care hospital****Dr. Vallampalli Ganesh**

Assistant Professor, Department of General Medicine, Government Medical College & Government General Hospital, Kadapa, Andhra Pradesh, India

Corresponding Author:

Dr. Vallampalli Ganesh

Abstract

Background: Age-related anaemia in the elderly should not be considered as a given. Anaemia is now understood to put older persons at risk for a variety of negative outcomes, such as hospitalisation, morbidity, and mortality¹. In light of the fact that the older demographic is an important one and is expanding quickly, anaemia is becoming more common as people age². Anaemia is defined by the World Health Organisation (WHO) as haemoglobin below 12 g/dL in women and below 13 g/dL in men³.

Objectives

1. To study the clinical profile of patients with anemia in elderly.
2. To study hematological pattern of anemia in elderly.
3. To know the etiology of anemia in elderly.

Material & Methods

Study Design: A prospective hospital based cross-sectional study.

Study area: Department of General Medicine, Government Medical College, Kadapa, Andhra Pradesh.

Study Period: 1 year.

Study population: Inpatients and outpatients aged ≥ 65 years attending to medical outpatient department (OPD) or admitted in medical wards of Government General Hospital, Kadapa.

Sample size: Two Hundred ten patients above the age of 65 years were included in the study.

Sampling method: Simple random technique.

Results: Peripheral smear studies in the study population include % of microcytic hypochromic 98 cases (46.66%) of cases Normocytic normochromic 81 cases (40.95%) Macrocytic hypochromic 26 cases (12.38%). Serum ferritin levels were estimated in all patients having a microcytic blood picture. Total of 11 out of 30 patients had serum ferritin values < 20 ng/ml (absolute iron deficiency), 3 patients had no evidence of iron deficiency having ferritin values > 100 ng/ml and 16 patients had varying degree of iron deficiency (with ferritin values between 20 and 100 ng/ml).

Conclusion: Thus evaluation of anemia by both history, clinical examination, laboratory studies help us to identify the cause, and unnecessary usage of iron supplements and NSAIDS can be reduced.

Keywords: Anemia, elderly, hemoglobin, chronic disease, blood picture

Introduction

Age-related anaemia in the elderly should not be considered as a given. Anaemia is now understood to put older persons at risk for a variety of negative outcomes, such as hospitalisation, morbidity, and mortality^[1]. In light of the fact that the older demographic is an important one and is expanding quickly, anaemia is becoming more common as people age^[2]. Anaemia is defined by the World Health Organisation (WHO) as haemoglobin below 12 g/dL in women and below 13 g/dL in men^[3].

The world's population of 7 billion people, or around 11.5 percent, are above the age of 60. This percentage is anticipated to rise by roughly 22% by 2050, when the elderly will outnumber youngsters (under the age of 15). The age group with the fastest rate of growth is the elderly, while the segments of children and people in their working years will gradually decline. However, in some nations, the share of the old is increasing more quickly than the world average. From 22.4 percent in 2012 to 31.9 percent in 2050, the share of the elderly may rise in wealthy nations. In less developed nations, this ratio is predicted to more than double, rising from 9.9% in 2012 to 20.2 percent in 2050. In least developed countries, the proportion of the elderly in 2050 is projected to be below 11 percent^[4].

In India, the proportion of the old has been rising steadily in recent years, and this trend is projected to continue in the next decades. According to projections, the percentage of people over 60 will rise from 8% in 2015 to 19% in 2050. The elderly will make up over 34% of the nation's population by the end of the century^[5]. Among our nation, anaemia among the elderly is a relatively common condition. Although nutritional anaemias are still widespread in India, normocytic anaemia is the form that is discovered most commonly.

This study was carried out as the prevalence of anemia increases with age and is frequently multifactorial. We postulated that malnutrition contributes to anemia in the elderly and is underdiagnosed. The objective was to evaluate the anemia in outpatient and inpatient in geriatric population, because anemia is a sign, and hence to identify the underlying cause^[6]. Identifying anemia as an important aspect of a comprehensive geriatric assessment is absolutely essential further to clinical detection^[7]. Confirming the type of anemia is critical to direct the investigation for profiling the etiology since it is well known that the treatment of anemia goes a long way in improving the overall outcome and quality of life^[8].

Objectives

1. To study the clinical profile of patients with anemia in elderly.
2. To study hematological pattern of anemia in elderly.
3. To know the etiology of anemia in elderly.

Material & Methods

Study design: A prospective hospital based cross-sectional study.

Study area: Department of General Medicine, Government Medical College, Kadapa, Andhra Pradesh.

Study period: 1 year.

Study population: Inpatients and outpatients aged ≥ 65 years attending to medical outpatient department (OPD) or admitted in medical wards of Government General Hospital, Kadapa.

Sample size: Two Hundred ten patients above the age of 65 years were included in the study.

Sampling method: Simple random technique.

Inclusion criteria: Age ≥ 65 years, Hemoglobin < 12 gm% in females, Hemoglobin < 13 gm% in males.

Exclusion criteria: Those who did not give consent.

Study tools and data collection procedure

The parameters for this study were age distribution, gender distribution, symptoms at the time of admission, physical examination findings, patients, hemoglobin level, hematocrit, red cell indices, peripheral smear, reticulocyte count, serum creatinine, iron studies, esophagoduodenoscopy, colonoscopy, bone marrow studies.

Statistical analysis

The data obtained was coded and entered into Worksheet. The categorical data was expressed as rates, ratios and proportions and comparison was done using chi-square test. The continuous data was expressed as mean \pm standard deviation (SD). A probability value ('p' value) of less than or equal to 0.05 was considered as statistically significant.

Observations & Results

Table 1: Age Wise Distribution

Age in Years	No of Patients	No of patient with Hb in (gm/dl) 10.0 and above	No of patient with Hb in (gm/dl) 7-9.9	No of patients with Hb in (gm/dl) 6.9 and below
65-70	124	16	59	49
71-80	58	8	21	29
81-90	28	2	10	16
TOTAL	210			

Mean age of the study is 70 years. In the study out of 210 patients were included patients between the age group 65-70 years were 59.04%, 71-80 years were 27.61% and 81 -90 years were 13.33%.

Table 2: Sex distribution of anemia in the study population

Gender	No of patients	No of patients with Hb in (gm/dl) 10.0 and above	No of patients with Hb in (gm/dl) 7-9.9	Hb(gm/dl) <6.9
Female	124	14	52	58
Male	86	12	38	36
Total	210			

In the study group out of total 210 patients 124 were females (59.04%) and 86 were males (40.95%) severity of anemia was more in females compared to males.

In the study population out of 210 individuals 176 were from rural and 34 were from urban the severity of anemia was more in rural population. The percentage of population with Hb (gm/dl) 10 gm/dl and above include -12.5% from rural population and -11.76% in urban population.

Table 3: Symptoms of people in the study group

Sl. No.	Symptoms	Hb(gm/dl)>10 and above	Hb(gm/dl) 7.0-9.9	Hb(gm/dl) <6.9	% of cases
1.	Chest pain	11	43	52	106 50.4%
2.	Shortness of breath	4	23	13	40 19.04%
3.	Dysphagia	3	7	12	22 10.47%
4.	Malena	3	9	7	19 9.04%
5.	Bleeding per rectum	5	8	10	23 10.95%

In the study population majority of population had easy fatigability chestpain (50.4%) followed by shortness of breath (19.04%), dysphagia (10.4%), bleeding per rectum (10.95%) and malena in (9.04%).

Table 4: Severity of anemia in the study group

Group	No. of Cases	%
Hb (gm/dl)>10.0	26	12.3%
Hb (gm/dl)7-9.9	90	42.8%
Hb (gm/dl)<6.9	94	44.7%

Mean hemoglobin in gm/dl of study population is 9 gm/dl.

Table 5: Study of peripheral smear in the study group

Sl. No.	Peripheral smear	No of persons	% of cases
1.	Microcytic hypochromic	98	46.66%
2.	Normocytic normochromic	86	40.95%
3.	Macrocytic hypochromic	26	12.38%
	Total	210	

Peripheral smear studies in the study population include % of microcytic hypochromic 98 cases (46.66%) of cases Normocytic normochromic 81 cases (40.95%) Macrocytic hypochromic 26 cases (12.38%).

Table 6: Prevalence of anemia in elderly

Type of anemia	Iron deficiency anemia	Anemia of chronic disease	Megaloblastic anemia	Malignan cies	Hemolytic anemia
No of patients	98	81	19	9	3
% of cases	46.6%	38.57%	9.04%	4.28%	1.42%

Table 7: Serum iron studies in microcytic hypochromic anemia

Serum ferritin in µg/dl	Study population	% of cases
<30µg/dl	43	43.87
31-60µg/dl	34	34.69
>60µg?dl	21	21.42
total	98	

Serum ferritin levels were estimated in all patients having a microcytic blood picture. Total of 11 out of 30 patients had serum ferritin values <20 ng/ml (absolute iron deficiency), 3 patients had no evidence of iron deficiency having ferritin values >100 ng/ml and 16 patients had varying degree of iron deficiency (with ferritin values between 20 and 100 ng/ml).

Table 8: Cause of anemia in CKD

Sl. No.	Peripheral smear in CKD patients	No. of cases	% of cases
1.	Normocytic normochromic anemia	79 cases	80.76%
2.	Microcytic hypochromic	10 cases	11.2%

Twenty-nine bone marrow aspirations and 21 biopsies were performed. Iron deficiency and mild myelofibrosis were found in one patient each. The rest of the bone marrow examinations were normal. During 15.5 +/- 10.3 months of follow-up, the hemoglobin level rose marginally to 10.9 + 1.0 g/dL (P < .0002). No changes in clinical or laboratory variables that could be ascribed to anemia were detected.

Discussion

In the study out of 210 patients were included patients between the age group 65-70 years were 59.04%, 71-80 years were 27.61%, and 81-90 years were 13.33%. The study group shows as the age increases the percentage of fall in haemoglobin increases. In the study group out of total 210 patients 124 were females (59.04%) and 86 were males (40.95%) severity of anemia was more in females compared to males. Similar results were obtained in Salive, M.E., Cornoni-Huntley, J., Guralnik, J.M., Phillips, C.L., Wallace, R.B., Ostfeld, study^[9].

Kushang V. Patel *et al.*^[10] showed, the prevalence of anemia increased as a function of age after the 5th decade of life in both men and women; however the age associated increase in prevalence was more dramatic in men. At ages 75 years and older, anemia was more common in men than in women. The cross-over effect whereby men are more likely than women to have anemia at older ages than at younger ages reflects the application of sex specific criteria for defining anemia and implicitly, sex differences in the distribution of haemoglobin concentration.

Vittorio Emanuele Bianchi *et al.*^[10] study shows; the prevalence of anemia increased as a function of age both in men and in women, but with advanced age, the prevalence was more dramatic for men. At 75 years old, the incidence of anemia was greater in men than in women. In the oldest population (85 years and older), the incidence of anemia was 29.6-30.7% in men and 16.5-17.7% in women.

In the study population out of 210 individuals 176 were from rural and 34 were from urban the severity of anemia was more in rural population. The percentage of population with Hb(gm/dl) 10 gm/dl and above include -12.5% from rural population and -11.76% in urban population. In the study population majority of population had easy fatigability chestpain (50.4%) followed by shortness of breath (19.04%), dysphagia (10.4%), bleeding per rectum (10.95%) and malena in (9.04%).

The study population is compared to the given below studies: K. G. Prakash*, Devendrappa. K.R, Madhukumar; *et al.*;^[12] The most common presentation was easy fatigability 44 (88%), followed by dyspnoea 35 (70%) and giddiness 30 (60%). The rare presentations were bleeding per rectum 3 (6%), difficulty in walking 2 (4%) and Hematemesis 1(2%). In our study population symptoms such as giddiness and hematemesis are rare and the symptom of easy fatigability is described by majority of patients so we not taken into consideration of that symptom. The study population easy fatigability act as a confounding factor, because easy fatigability is present in all the patients who ever is coming to the hospital. Dysphagia is next predominant manifestations because in our study group females represent (n=124) contributes to 59.04%.

Peripheral smear studies in the study population include % of microcytic hypochromic 98 cases (46.66%) of cases Normocytic normochromic 81 cases (40.95%) Macrocytic hypochromic 26 cases (12.38%). Indira Bangren *et al.*;^[13] findings consistent with our study microcytic anemia is the most common type. Amit bhasin *et al.*;^[14] showed in their study normocytic normochromic anemia is the most common type of anemia. Milind Bhasin *et al.*;^[15] showed microcytic hypochromic anemia is the most common type of anemia. Ghalaut P.S. *et al.*;^[16] showed microcytic hypochromic anemia is the most common type of anemia.

Evaluation of causes of anemia in elderly in the study group: iron deficiency-46.6%.

- Anemia of chronic disease-38.57%.
- Megaloblastic anemia-9.04%.
- Malignancies-4.28%.
- Haemolytic anemia-1.42%.

In the study population iron deficiency is the most common type of anemia in elderly, followed by anemia of chronic disease.

In their study Prakash KG *et al.*,^[17] Anemia of chronic Inflammation was the most common cause of anemia in the elderly patients n=16 (32%), followed by Iron Deficiency anemia n=12 (24%) and the third cause being hematological malignancies n=9 (18%). Whereas vitamin B12 and folate deficiency were responsible for 10% of anemias in the study. The less frequent causes were aplastic anemia n=2(4%) and hypothyroidism n=1(2%). Even after extensive investigations, the Cause of anemia could not be established in 4 (8%) of patients, where it was assigned as Anemia of Unknown Etiology (AUE).

Similar results were observed in a study done by Ferrucci *et al.*^[18] where anemia of chronic

inflammation contributed to 33% of cases, iron deficiency in 22% of cases, B12 & folate deficiency in 8%, AUE in 23% of cases. Anemia of Chronic Inflammation was also the most common cause of normocytic anemia. 68.75% of patients with Anemia of Chronic Inflammation had normocytosis while 31.25% had microcytosis.

In the study population evaluation of microcytic anemia the major causes are nutritional mainly iron deficiency anemia-38.7% of cases, haemorrhoids-17.34% of cases, duodenal ulcer-23.46%, carcinoma colon 10.2%, CKD-10.2%. In the study population causes of normocytic normochromic anemia was chronic kidney disease-91.86%, malignancies-3.48%, infections-4.65%. Serum ferritin levels were estimated in all patients having a microcytic blood picture. Total of 11 out of 30 patients had serum ferritin values <20 ng/ml (absolute iron deficiency), 3 patients had no evidence of iron deficiency having ferritin values >100 ng/ml and 16 patients had varying degree of iron deficiency (with ferritin values between 20 and 100 ng/ml).

Although the prevalence of anemia does increase with age, successful aging is not usually associated with anemia. Anemia should not be accepted as an inevitable consequence of aging, because a cause is identified in about 80% of elderly patients. In ambulatory elderly patients, the most common causes of anemia are chronic disease (kidney disease, infections, malignancies, and chronic inflammatory disorders), iron deficiency, and nutritional and metabolic disorders. Frequently, multiple factors contribute to the problem in the individual patient. Proposed mechanisms include the presence of inflammatory cytokines and abnormal cytokine modulation of erythropoiesis, due both to abnormal production of stimulatory cytokines and decreased responsiveness of the erythroid precursors. Avishay Elis, Moti Ravid *et al.* [17] evaluated idiopathic normocytic normochromic anemia.

Anemia and CKD relation: CKD can lead to anemia it has been hypothesized that anemia may contribute to progression of kidney disease. Possible mechanisms include renal ischemia caused by reduced oxygen delivery due to low Hb and underlying heart failure. For example, anemia may worsen renal medullary hypoxia, leading to renal interstitial injury and fibrosis. In the study population chronic kidney disease is the second most cause of anemia contributing to anemia in elderly.

Dr Raveendra *et al.* [19] study shows: 50 cases of CKD were randomly selected for this cross sectional study between October 2012 to August 2014. All patients were examined and investigated thoroughly as per the proforma.

Results: The most common type of anemia was NNA with 33(66%) patients. MHA 9(18%) patients and NHA 8(16%) patients mean Hb% was 8.49±1.17 gm%.

Conclusion

Our study showed that most common anemia was microcytic hypochromic anemia (46.66%) the cause of microcytic hypochromic was iron deficiency anemia (46.66%). Second most common cause is normocytic normochromic anemia (40.5%) most of them are Chronic Kidney disease (91.86%). In macrocytic anemia serum vitamin B12 and folic acid is the most common (19%). NSAIDS (Non-Steroidal Anti-inflammatory Drug) were also identified as the cause of anemia (42.38%). Thus evaluation of anemia by both history, clinical examination, laboratory studies help us to identify the cause, and unnecessary usage of iron supplements and NSAIDS can be reduced.

References

1. Culleton BF, Manns BJ, Zhang J, Tonelli M, Klarenbach S, Hemmelgarn BR. Impact of anemia on hospitalization and mortality in older adults. *Blood*. 2006; 107:3841-3846.
2. Denny SD, Kuchibhatla MN, Cohen HJ. Impact of anemia on mortality, cognition, and function in community-dwelling elderly. *Am J Med*. 2006; 119:327-334.
3. Price EA, Schrier SL. Anemia in the elderly: introduction. *Semin Hematol*. 2008; 45:207-209.
4. Izaks GJ, Westendorp RG, Knook DL. The definition of anemia in older persons. *JAMA*. 1999; 281:1714-1717.
5. Nutritional Anemias. Report of a WHO scientific group World Health Organ Tech Rep Ser. 1968; 405:5.
6. Price EA, Mehra R, Holmes TH, Schrier SL. Anemia in older persons: etiology and evaluation. *Blood Cells Mol Dis*. 2011; 46:159.
7. Pang WW, Schrier SL. Anemia in elderly *Curr Opin Hematol*. 2012; 19:133.
8. Merchant AA, Roy CN. Not so benign haematology; anemia in elderly. *Am J Haematol*. 2012; 156:173.
9. Anemia and hemoglobin levels in older persons: relationship with age, gender, and health status. *J Am Geriatr Soc*. 1992 May;40(5):489-96.
10. 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; 104:2263-2268.
11. 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; 6:81-89.
12. Prevalence of Anemia among rural population living in and around of rural health and training center, Ratua Village of Madhya Pradesh Sanjay Kumar Gupta, Sanjay S Agarwal, Rituja Kaushal, Ambuj Jain, Vineet Kumar Gupta, Neeraj Khare. Department of Community Medicine, Peoples College of Medical Sciences and Research, Bhopal, Madhya Pradesh, India. 2014; 5:15-18.
 13. Usefulness of physical examination in detecting the presence or absence of anemia. Nardone DA1, Roth KM, Mazur DJ, McAfee JH. *Arch Intern Med*. 1990 Jan;150(1):201-4.
 14. Dr. Indira S Bangera. A Study of Morphological Types of Anemia *International Journal of Science and Research (IJSR)* ISSN (Online): 2319-7064 Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391, 2017 June, 6(6).
 15. Characteristics of Anemia in Elderly: A Hospital Based Study in South India Amit Bhasin and Medha Y. Rao *Indian J Hematol Blood Transfus*. 2011 Mar;27(1):26-32.
 16. Clinical Profile of Patients Presenting with Anemia in a Tertiary Care Rural Hospital of Western Maharashtra Milind Chandurkar¹, Shrivastava Pendalya² ¹Professor, ²Resident, Department of Medicine, Rural Medical College, Pravara Institute of Medical Sciences (Deemed University), Loni, Maharashtra, India. *Int. J. Clin. Biomed Res*. 2017;3(4s):74-77.
 17. A Clinical Approach to Idiopathic Normocytic-Normochromic Anemia. Available from: https://www.researchgate.net/publication/14525683_A_Clinical_Approach_to_Idiopathic_Normocytic-Normochromic_Anemia.
 18. Kumar P. *Clark text of internal medicine* 6th edition page no 364.
 19. Iron deficiency in the elderly population, revisited in the hepcidin era Fabiana Busti, Natascia Camprostrini, Nicola Martinelli, Domenico Girelli *Front Pharmacol*. 2014; 5:83.