ORIGINAL RESEARCH PAPER

Volume-8 | Issue-6 | June-2019 | PRINT ISSN No. 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A STUDY OF BIOCHEMICAL PROFILE OF ANEMIA IN ELDERLY POPULATION IN A TERTIARY CARE HOSPITAL OF WEST BENGAL

Biochemistry

Dr. Debasmita Bandyopadhyay — Assistant Professor, Department of Biochemistry, IPGME&R, SSKM, Kolkata-20

Dr. Jayati Roy Choudhury* — Assistant Professor. Department of Biochemistry, IPGME&R, SSKM, Kolkata-20 *Corresponding Author

Dr. Santanu Banerjee — Professor, Department of Biochemistry, IPGME&R, SSKM, Kolkata-20

ABSTRACT

With increase in life expectancy, nowadays elderly persons cater a large percentage of population. Anemia is present in 10% of women and 11% of men over the age of 65, increasing to 20% of women and 26% of men over 85 .[1]

Aims: To study and compare the anemia profile between elderly male and female patients aged between 51-80 years & to study the possible etiological profile**.**

Material and Methods: In this retrospective cross sectional study we studied the investigation reports of 100 female and 143 male patients between 51-80 years age with anemia.

Results: No significant differences were found between levels of haemoglobin, serum iron and transferrin saturation index (TSI) in elderly male and female. In 51-80 years age group, both female and male patients mostly have moderate anemia . In female anemic patients between 51-80 years, about 19.00% had iron deficiency anemia (IDA), 11.00%, had anemia due to chronic kidney disease(CKD), 9.00% had anemia due to inflammatory causes(INF),13.00 % had malignancy (CA) and 48.00 % patients had anemia due to other causes (OTH). In male,the percentage of IDA,CKD,INF,CA and OTH is 16.90% , 25.35% , 9.15 % , 11.27 % and 37.32% respectively.

Conclusion: Early investigations in elderly anemic patients may have implications in reducing morbidity and mortality to a significant extent.

KEYWORDS

Elderly, Anemia, Etiology , Iron status.

INTRODUCTION:

With increase in life expectancy, nowadays elderly persons cater a large percentage of population. The world as a whole will have about 435 million additional elderly persons to reach 1.2 billion by 2025 from 765 million in 2010. [2]They need good medical care to reduce their morbidity. But many of their problems remain undiagnosed. Anemia is one such problem. Anemia is present in 10% of women and 11% of men over the age of 65, increasing to 20% of women and 26% of men over 85 .[1] An even higher prevalence is seen in hospitalized patients, of whom approximately 40–50% have been found to be anemic.[3] But often it remains unrecognized and hence untreated. Many physicians continue to neglect the significance of anemia as a serious clinical condition in the elderly. [4] While decreased hemoglobin levels were previously largely considered a normal consequence of aging, there is now evidence that anemia is associated with an increased risk for morbidity and mortality. [5,6] Because anemia is a sign, not a diagnosis, an evaluation is almost always warranted to identify the underlying cause. The purpose of this work is to study and compare the biochemical profile of anemia between elderly male and female patients aged between 51-80 years as well as to study the possible etiology.

Review of literature: Anemia is a common concern in older people and can have significant morbidity and mortality. After 50 years of age, prevalence of anemia increases with advancing age and exceeds 20% in those ≥ 85 years of age.[7] According to a study in Korean population by Ok Lee J et al , anemia was least prevalent (0%-1.1%) in males 10-49 yr, but gradually increased to 12.8% by ≥70 yr. In adult females, the prevalence of anemia was lowest between 55-59 yr, and highest (24.9%) ≥75 yr.[8]

Anemia in elderly is multifactorial. In addition to nutritional causes, different types of comorbidities are responsible for anemia in elderly. In the study of older persons with anemia by Guralnik JM et al, evidence of nutrient deficiency was present in one third, anemia of chronic inflammation or chronic renal disease or both was present in one third, and unexplained anemia was present in one third.[1] In study by Price EA et al 12% of participants had iron deficiency anemia. Of those with iron deficiency in whom there was follow-up information, half normalized their hemoglobin in response to iron repletion, and half did not. 35% of participants had unexplained anemia.[9] In study by A S Artz et al anemia etiologies included iron deficiency anemia in 25.3%, anemia of chronic inflammation in 9.8%, and hematologic malignancy in 7.5%. Unexplained anemia in the elderly accounted for 43.7%.[10] Morbidity was higher in anemic subjects than non anemic persons as has been seen in the study by Bach v et al. Renal insufficiency with a glomerular filtration rate <30 mL/min/1.73 m^2(11.3% versus 2.1%), hyperinflammation (62.1% versus 31.4%), absolute (14.4% versus 6.9%) or functional (28.2% versus 11.8%) iron deficiency, and folate deficiency (6.7% versus 3.0%) were observed significantly more often than in nonanemic subjects (P<0.001).[11] So, in this background , we did an observational cross-sectional study to compare the biochemical profile of anemia between elderly male and female patients aged between 51-80 years as well as to study the possible etiology.

MATERIALS AND METHODS:

Data collection:

Clinical data and laboratory values of all anemic patients aged 51-80 years investigated and treated at Institute of Post Graduate Medical Education and Research (IPGME&R), Kolkata between October 1, 2018 and April 30, 2019 were analyzed in the deparetmental laboratory in the Department of Biochemistry of IPGME&R.

Study population

We studied the data of investigation reports of 100 female and 143 male patients between 51- 80 years age with anemia. (Hemoglobin was estimated by Drabkin's method)

Definition of anemia

Anemia was defined as hemoglobin <12 g/dL in women and <13 g/dL in men, in accordance with World Health Organization (WHO) criteria.[12]

The cut-offs defining mild, moderate and severe anaemia were first presented in the 1989[13] For non-pregnant women (15 years of age and above) haemoglobin level between 11.0- 11.9 g/dl is mild anemia, 8.0-10.9 g/dl is moderate anemia and lower than 8.0g/ dl is severe anemia . For men (15 years of age and above) mild anemia haemoglobin is between 11.0- 12.9g/dl, in moderate anemia haemoglobin is between 8.0-10.9 g/dl and in severe anemia haemoglobin is lower than 8.0 g/dl .

If the transferrin saturation was less than 10% and the ferritin level was less than 30 ng per milliliter, iron deficiency was diagnosed as the cause of the anemia. When transferrin saturation was low (<16%) and the ferritin level was high (>200ng/ml), the diagnosis of anemia of inflammation was generally considered. [14]

Study design and study methods :
It is a retrospective cross sectional study. The parameters we studied were serum iron ,serum ferritin ,TIBC(Total iron binding capacity), and TSI . Serum iron and TIBC were analysed by autoanalyser (RANDOX IMOLA) following colorimetric principle. Serum ferritin were analysed by immunoassay by electrochemiluminescence (using Immulite 1000).TSI was estimated using standard formula .[TSI=(Serum iron /TIBC)X100]

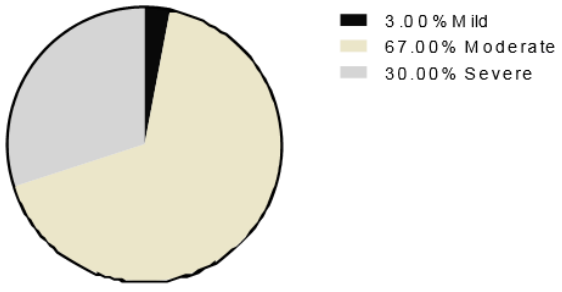
Statistical analysis :
Statistical methods were done using graph pad prism 7 software.

RESULTS:

Table 1. Comparison of haemoglobin, serum iron level and transferrin saturation index between elderly male and female population aged between 51-80 years.

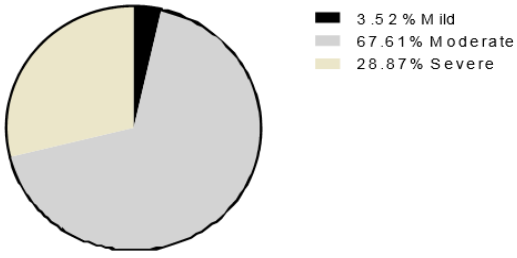
Population		Parameters					
		Hemoglobin		Serum iron level		Transferrin saturtation index	
		Mean±SD	P value	Mean±SD	P value	Mean±SD	P value
51-60years	Male	8.48±0.15	0.9044	64.16±4.84	0.3096	27.67±3.02	0.1328
	Female	8.51± 0.21		56.46±5.8		20.91± 3.29	
61-70 years	Male	8.61± 0.17	0.5742	65.61±6.02	0.0557	22.09± 2.32	0.1293
	Female	8.76± 0.21		49.91±4.02		17.24± 1.69	
71-80years	Male	8.69± 0.26	0.0592	57.53±4.83	0.0894	19.8± 2.22	0.1748
	Female	9.67± 0.32		74.2± 7.27		25.61± 2.33	
Total	Male	8.57± 0.11	0.4320	63.18±3.14	0.1389	23.86± 1.59	0.1384
	Female	8.71±0.15		56.01±3.64		20.13± 1.95	

Anemia In female population between 51 - 80 years



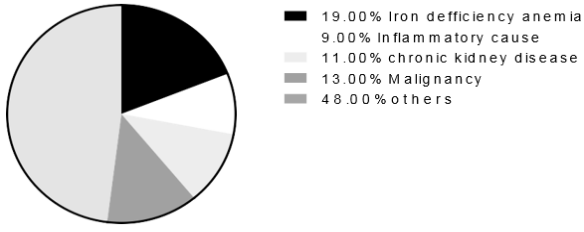
Picture 1.

Anemia in Male population between 51 - 80 years



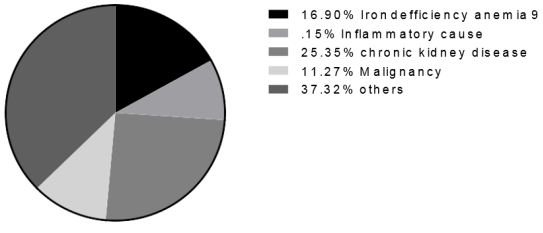
Picture 2.

Causes leading to anemia in female age d 51 - 80 years



Picture 3.

Causes leading to anemia in male age d51 - 80 years



Picture 4.

DISCUSSION:
Anemia is a common concern in older people and can have significant morbidity and mortality. Part of the problem here relates to its definition, which is based on WHO- criteria.[12] An analysis of two databases (NHANES-III, Third U.S. National Health andNutrition Examination Survey; and SCRIPPS-Kaiser Data, 1998–2002) found that normal ranges for hemoglobin values are unchanged for aging populations, with the exceptions of minor adjustments for males.[15] So, in this background , we did a study to compare the biochemical profile of anemia between elderly male and female patients aged between 51-80 years as well as to study the possible etiology. We studied the data of investigation reports of 100 female and 143 male patients with anemia. We found no significant difference between levels of haemoglobin between elderly male and female. (in male mean±SD 8.57±0.11,in female mean±SD 8.71 ±0.15, P value 0.4320). No significant difference was found even in different age groups between 51-80 years.(51-60 years age group in male mean±SD 8.48±0.15,in female mean±SD 8.51±0.21, P value0.9044,) ,(61-70 years age group in male mean±SD 8.61±0.17,in female mean±SD 8.76±0.21, P value 0.5742),(71-80 years age group in male mean±SD 8.69±0.26,in female mean±SD 9.67±0.32, P value0.0592,)). No significant difference was found even for serum iron and Transferrin saturation index in different age groups between 51-80 years.(vide Table1) but in the study by Bach V et al, the prevalence of anemia was significantly correlated with advanced age (r=0.21; P<0.001) and male sex (P<0.001)[11]

Between 51-80 years female anemic patients, about 3% had mild anemia, 67% had moderate anemia, and 30% had severe anemia. In the 51-80 years male anemic patients , about 3.52% had mild anemia, 67.61% had moderate anemia, and 28.87% had severe anemia. (vide Picture 1 and 2)

In our study ,in female anemic patients between 51-80 years, about 19.00% had iron deficiency anemia(IDA), 11.00%, had anemia due to chronic kidney disease(CKD), 9.00% had anemia due to inflammatory causes(INF),13.00 % had malignancy (CA) and 48.00 % patients had anemia of other cause (OTH).In male ,the percentage of IDA,CKD,INF,CA and OTH is 16.90% , 25.35% , 9.15 % , 11.27 % and37.32 % respectively.(vide Picture 3 and 4)

In our study, 16.90% male and 19% female had iron deficiency anemia whereas in study by Bhasin A et al 34% of men had iron deficiency and none of the women had iron deficiency anemia.[16]This difference in the population having iron deficiency in our study could be explained by nutritional iron intake in Indian population.

25.35% male and 11% female in our study had renal insufficiency whereas 22% of the patients study by Bhasin A et al were found to have to renal failure [16]and Jack and co- workers revealed anemia due to chronic renal failure was found in 13.2% of patients.[17]

11.27% male and 13% female in our study had diagnosed malignancy whereas in study by AS Artz et al hematologic malignancy was found in 7.5% patients.[10]The significance of anemia in elderly patients with cancer is evidenced by increased mortality rates, reduced cognitive function, increased risk of congestive heart failure, fatigue, and

dependence, increased risk of chemotherapy-induced complications.[18]

According to Poggiali E et al, anaemia of chronic inflammation is the most common cause of anaemia in admitted patients.[19]In our study, we found anemia in 9.15% of elderly anemicmale patients and 9% of female were due to inflammatory cause. The pathophysiology of anemia of chronic inflammation is multifactorial, due to shortened erythrocyte survival, impaired proliferation of erythroid progenitor cells, and abnormalities of iron metabolism but several other factors, including chronic blood loss, hemolysis, or vitamin deficiencies, can aggravate anemia .[19]In some studies , it is also the second most prevalent cause of anaemia, after iron deficiency anaemia (IDA). [20,21,22]

Study of older persons with anemia by Guralnik JM et al using data of distribution of types of anemia in the approximately 3 million older anemic persons in phase 2 (1991-1994) of The Third National Health and Nutrition Examination Survey (NHANES III),unexplained anemia was present in one third.[1] In study by Artz AS et al,Unexplained anemia in the elderly accounted for 43.7%.[10]

In our study also anemia due to causes other than IDA, INF, CKD and CA was 48% in elderly female and 37.32% in elderly male anemic patients. Some of them may be due to nutritional causes other than IDA like vitamin B12 and folic acid deficiency, some may be due to undiagnosed malignancy or myelodysplastic syndromes and some due to unknown cause.

Drawback of our study:

We could not include elderly patients who are hospitalized with severe ailments or are bed ridden and unable or reluctant to attend hospital specially in 71-80 years of age group and specially female patients. We also could not measure serum vitamin B12 and folic acid to diagnose nutritional anemia other than iron deficiency anemia. Also, there is some overlapping in the causes as some of the malignant patients are having blood loss and are having iron deficiency.

CONCLUSION:

So, from this study we can come to a conclusion that anemia can be the first and sole symptom in a number of different diseases in elderly and hence, physicians should be cautious to diagnose anemia in elderly patients . In this study , we have seen that most of the patients have been presented with moderate anemia and we can assume that if they were investigated in early stage of anemia, there are possibilities of early etiological diagnosis

This may have implications in reducing morbidity and mortality to a significant extent.

ACKNOWLEDGEMENT:

We are thankful to the Department of Biochemistry, IPGME&R for cooperation in every aspect.

REFERENCES:

1. 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.
2. WHO. Health situation and trend assessment. Regional office for South East Asia.
3. Petrosyan I, Blaison G, and Andrés E, "Anaemia in the elderly: an aetiologic profile of a prospective cohort of 95 hospitalised patients," European Journal of Internal Medicine, vol. 23, pp. 524–528, 2012.
4. Nissenson A. R., Goodnough L. T., and Dubois R. W. "Anemia: not just an innocent bystander?" Archives of Internal Medicine, vol. 163, no. 12, pp. 1400–1404, 2003.
5. Denny S. D., Kuchibhatla M. N., and Cohen H. J., "Impact of anemia on mortality, cognition, and function in community-dwelling elderly," American Journal of Medicine, vol. 119, no. 4, pp. 327–334, 2006.
6. Penninx B. W. J. H., Pahor M., Woodman R. C., and Guralnik J. M., "Anemia in old age is associated with increased mortality and hospitalization," Journals of Gerontology A, vol. 61, no. 5, pp. 474–479, 2006.
7. Patel KV. Epidemiology of anemia in older adults. Semin Hematol. 2008;45: 210– 217.
8. Lee S J O, Lee J H, Ahn S, Kim J W ,Chang H, Kim Y J, K W Lee, Kim J H, Bang S M and Lee J S. Prevalence and Risk Factors for Iron Deficiency Anemia in the Korean Population: Results of the Fifth Korea National Health and Nutrition Examination .J Korean Med Sci. 2014 Feb; 29(2): 224–229.
9. Price EA, Mehra R, Holmes TH, Schrier SL. Anemia in older persons: etiology and evaluation. Blood Cells Mol Dis. 2011;46:159–165.
10. Artz AS, Thirman MJ. Unexplained anemia predominates despite an intensive evaluation in a racially diverse cohort of older adults from a referral anemia clinic. J Gerontol A Biol Sci Med Sci. 2011;66:925–932
11. Bach V, Schruckmayer G, Sam I, Kemmler G, and 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: 1187–1196.
12. World Health Organization. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Geneva, Switzerland: World Health Organization; 2011. [Accessed May 5, 2014].
13. Preventing and controlling anaemia through primary health care: a guide for health administrators and programme managers. Geneva, World Health Organization, 1989.
14. Keel SB, Abkowitz JL. The microcytic red cell and the anemia of inflammation. N Engl J Med. 2009;361:1904–1906.
15. Beutler E, Waalen J. The definition of anemia: what is the lower limit of normal of the blood hemoglobin concentration? Blood. 2006;107:1747–1750.
16. Bhasin A, Rao M Y. Characteristics of Anemia in Elderly: A Hospital Based Study in South India Indian J Hematol Blood Transfus. 2011 Mar; 27(1): 26–32.
17. Chaves PHM, 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(7):1257–1264.
18. Tsimberidou A, Estey E H. The Significance of Anemia in Elderly Patients with Cancer. Cancer Complications, Oncology Journal. 2007 Jan; 21(1)
19. Poggiali E, Migone De Amicis M, Motta I: Anemia of chronic disease: a unique defect of iron recycling for many different chronic diseases. Eur J Intern Med 2014;25:12-17.
20. Weiss G: Pathogenesis and treatment of anaemia of chronic disease. Blood Rev 2002;16:87-96.
21. Weiss G, Goodnough LT: Anemia of chronic disease. N Engl J Med 2005;352:1011-1023.
22. Means RT Jr: Recent developments in the anemia of chronic disease. Curr Hematol Rep 2003;2:116-121.