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The prevalence of anemia in elderly patients: a cross-sectional study

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ABSTRACT

Introduction: As the elderly population continues to increase, physiological changes and pathological conditions in old age have started to attract more attention. Anemia is a common public health problem in both developed and developing countries. Many studies have emphasized the negative effects of anemia on poor physical performance, susceptibility to falls, impaired cognitive function and death in the elderly. Considering the classification of anemia, a substantial amount of unexplained anemia in the elderly population raises the question of whether this is a natural consequence of aging. Our aim in this study is to reveal the frequency of anemia in the geriatric population and to classification.

Material and Method: This retrospective cohort study was conducted with the evaluation of patients admitted to the internal medicine outpatient clinic of a secondary state hospital in Ankara. All patients over the age of 65 who applied to the internal medicine outpatient clinic with different complaints between December 2020 and September 2021 and had a hemogram test were evaluated for eligibility for the study.

Results: Anemia was present in 103 of 1210 patients over 65 years of age included in our study. In our study group, the frequency of anemia was 8.5%. The median age of patients with anemia was 73 (65-93) years, and 60.1% (n=62) of these patients were women. The number of patients with at least one comorbidity was 74 (71.8%). The most common type of anemia in patients with anemia was iron deficiency anemia (n=47, 45.6%). Anemia of chronic disease (n=16, 15.5%) was the second most common anemia, and anemia due to vitamin b12 deficiency (n=4, 3.8%) and folic acid deficiency (n=3, 2.9%) was less common. The rate of unexplained anemia was 27.2% (n=28).

Conclusion: It was revealed in our study that anemia is a common health problem in elderly patients in our society, and that unexplained anemia can be seen at a substantial rate. The prevalence of anemia of approximately 10% in our study gives the message that anemia is an important public health problem for the elderly population and that health care providers should be careful in terms of preventive and therapeutic measures.

Keywords: Anemia, elderly, unexplained anemia

INTRODUCTION

Traditionally, patients aged 65 and over are defined as elderly (1). In the report published by the World Health Organization (WHO), it has been reported that the elderly population is increasing gradually, and it is estimated that 10-15% of the entire world population will consist of people over the age of 65 by 2030 (2). It is seen that the situation in our country is similar to that of the world. According to the data of the Turkish Statistical Institute (TUIK) for 2020, the elderly population in Turkey is 9.5% of the entire population, and 44.2% of this population consists of men and 55.8% women (3).

Biologically, aging is the accumulation of a series of damage that occurs at the molecular and cellular level. This damage leads to a decrease in physiological capacity over the years and an increase in the risk of various diseases. In this physiological process, which includes all organs and systems, it is of great importance to distinguish changes due to normal aging from pathological ones (4).

Anemia is a common public health problem in both developed and developing countries. Many studies have emphasized the negative effects of anemia on poor physical performance, susceptibility to falls, impaired cognitive function and death in the elderly (5-8). While

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anemia was detected in approximately 11% of the population over 65 years of age in the National Health and Nutrition Research Study (NHANES III), this rate increased to 26.1% in men and 20.1% in women over the age of 85 in the same study (9).

The most common causes of anemia etiology in the geriatric population are nutritional deficiencies (iron deficiency, vitamin B12 deficiency, folate deficiency) and chronic diseases (chronic kidney disease, inflammatory diseases), and there is a significant number of patients whose underlying cause cannot be explained. Anemia in this group is called unexplained anemia (UA) (10). UA appears to be the mainstay of the debate on whether anemia is a natural consequence of aging.

Our aim in this study is to reveal the frequency of anemia in the geriatric population and to investigate its etiology, which is an extremely important public health problem and can lead to hospitalization and loss of function if not treated appropriately.

MATERIAL AND METHOD

This retrospective cohort study was conducted with the evaluation of patients admitted to the internal medicine outpatient clinic of a secondary state hospital in Ankara. The study was approved by the Ethics Committee of the University of Health Sciences, Ankara Oncology Training and Research Hospital Ethics Committee (Date: 28.07.2021, Decision No: 2021-07/1311). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

All patients over the age of 65 who applied to the internal medicine outpatient clinic with different complaints between December 2020 and September 2021 and had a hemogram test were evaluated for eligibility for the study. Patients whose medical information could be accessed through a manual or electronic patient registration system were included in the study. Those under the age of 65 and with incomplete medical information were excluded from the study. According to the WHO definition, anemia is defined as a hemoglobin level of <13 g/dl in men and <12 g/dl in women. Only hemogram test results were recorded in non-anemic patients. In patients with anemia, demographic characteristics, chronic diseases and, etiological laboratory parameters that may be associated with anemia (MCV, MCHC, serum iron, iron binding capacity, ferritin, folate, vitamin B12 level, LDH, sedimentation, CRP, GFR, TSH, free T4) were recorded retrospectively and transferrin saturations were calculated.

As accepted in national and international guidelines, ferritin <12 mg/l and transferrin saturation <15% were defined as iron deficiency anemia, vitamin B12 level <200 pg/ml as vitamin B12 deficiency anemia, and folic acid level <3 ng/ml as folate deficiency anemia (11-13). Anemia with high levels of inflammatory markers (such as C-reactive protein) while iron stores are normal (transferrin saturation >15%, serum ferritin >12 ng/ml) and serum iron level is low (<60 g/dL) is defined as anemia of chronic disease (14). The type of anemia in which the etiology of anemia could not be explained and there was no nutritional deficiency or anemia of chronic disease was defined as unexplained anemia (9).

The primary endpoint of the study was to determine the frequency of anemia in patients aged 65 and over. The secondary endpoint was to determine the demographic characteristics and anemia subtypes of patients with anemia. Data were analyzed using the SPSS 23.0 (SPSS Inc., Chicago, IL, USA) program. Kolmogorov-Smirnov test was used to evaluate the distribution of data. The distribution of normal data was reported as mean ± standard deviation (SD), data with non-normal distribution and non-parametric data were reported as the median.

RESULTS

Anemia was present in 103 of 1210 patients over 65 years of age included in our study. In our study group, the frequency of anemia in geriatric patients was 8.5%. The median age of patients with anemia was 73 (65-93) years, and 60.1% (n=62) of these patients were women. The number of patients with at least one comorbidity was 74 (71.8%). The most common comorbid diseases were diabetes mellitus (n=35, 33.9%), hypertension (n=34, 33%) and coronary artery disease (n=21, 20.3%). Eight patients (7.7%) had chronic kidney disease, 7 (6.7%) patients thyroiditis, 6 (5.8%) patients malignancy, and 4 (3.8%) patients chronic obstructive pulmonary disease. Patient characteristics are shown in **Table 1**.

Table 1. Demographic characteristics patients with anemia

Variables	(n=103)	%
Age (years), Median (min-max)	73 (65-93)	
Gender		
Male	41	39.8
Female	62	60.1
Comorbidites		
Diabetes mellitus	35	33.9
Hypertansion	34	33.0
Coronary artery disease	21	20.3
Chronic kidney disease	8	7.7
Thyroidit	7	6.7
Chronic obstructive pulmonary disease	6	5.8
Anemia subtype		
Iron-deficiency anemia (IDA)	47	45.6
Vitamin B12 deficiency anemia	4	3.8
Folate deficiency anemia	3	2.9
Chronic disease anemia	16	15.5
Unexplained anemia	28	27.2
Mixed anemia (IDA/Vit B12 def.)	5	4.8

The most common type of anemia in patients with anemia was iron deficiency anemia (n=47, 45.6%). Anemia of chronic disease (n=16, 15.5%) was the second most common anemia, and anemia due to vitamin b12 deficiency (n=4, 3.8%) and folic acid deficiency (n=3, 2.9%) was less common. The rate of unexplained anemia was 27.2% (n=28).

The median hemoglobin value of the patients with anemia was 10.3 g/dl. Median white blood cell and platelet counts were normal. Median ferritin level was close to the lower limit, and parallel to this, transferrin saturation was also below normal. Median folic acid and vitamin B12 levels were also in the normal range. Anemia-related laboratory parameters of the patients are shown in **Table 2**.

Table 2. Laboratory values of patients with anemia

Variable	Median	Min-max	Normal
Hemoglobin (gr/dl)	10.3	5.0-12.9	12-17
MCV (fl)	82.0	59.0-119.0	80-100
White blood cells (/µl)	6800	3390-14800	4500-11000
Platellet (10^3/µl)	275	102-544	150-450
Ferritin (µg/l)	20.0	1.0-578	11-307
Folic asid (ng/ml)	7.0	2.6-44.0	2.7-17.0
Vitamin B12 (pg/ml)	284.0	3.8-1933	160-950
Total Bilirubin (mg/dl)	0.5	0.3-3.8	< 1.2
Lactate dehydrogenase (U/l)	201	126-2011	140-280
Transferrin saturation (%)	%15	%2-%50	15-50
C-reactive protein (mg/l)	5.2	0.1-98	< 10

DISCUSSION

In this study, which screened more than 1200 patients and aimed to investigate the frequency and etiology of anemia in the geriatric population, the frequency of anemia in patients over 65 years of age was found to be 8.5%. While iron deficiency anemia was present in approximately half of the patients with anemia, it was remarkable that unexplained anemia constituted approximately 27% of the cases.

With the increase in the elderly population in the world, it is more important to distinguish the physiological changes that occur with old age from the pathological ones (15,16). It has been reported that anemia, the negative effects of which have been clearly demonstrated in elderly patients, are seen at rates of up to 60% in the geriatric population in some countries (17,18). When evaluated etiologically, it was observed that up to 40% of these patients had unexplained anemia (9,19-20). This raises the question of whether anemia is a natural consequence of aging.

One of the earliest epidemiological studies investigating anemia in the elderly population was conducted in Minnesota in the 1990s. In this study, which included approximately 600 patients, the prevalence of anemia was found to be 9% in males and 7% in females over the age of 65. While patients with anemia due to acute bleeding constitute half of the whole group, it has been reported that anemia of unknown cause constitutes 16% of the group (19).

One of the most comprehensive and representative of the whole population studies on the prevalence of anemia in elderly patients has been reported from the US. Based on the data obtained from the population-based NHANES III study, the prevalence of anemia in the US population aged 65 and over was determined as 10.2%. Based on these results from approximately 4,200 patients in the geriatric population, one-third of patients had nutritional anemia (iron deficiency, vitamin B12 or folate deficiency), and one-third had anemia of chronic disease. The rate of unexplained anemia was 33% (9). The most important limitation of this study was the inability to perform all diagnostic tests for the etiology of anemia. This may have caused the unexplained anemia rate to be higher than it actually is.

In a population-based prospective observational study conducted in Italy, approximately 9000 elderly patients were investigated for anemia. The incidence of anemia in patients over 65 years of age has been determined as 11%. It has been reported that the frequency of anemia gradually increases with age and reaches 40% over the age of 90. Anemia of chronic disease, thalassemia, and renal failure were the most common mild anemia types, whereas the cause of anemia could not be explained in 26.4% of the cases (21).

In a large cross-sectional study, which retrospectively evaluated approximately 20,000 patients who applied to outpatient clinics in Austria, the frequency of anemia was determined as 21%. In the analysis performed for anemia classification, it was reported that approximately 60% of the cases had high inflammatory parameters, approximately half of them had renal insufficiency and 20% had nutritional deficiency (22).

Another study with a similar design to our study was reported from Poland in 2020. The frequency of anemia was found to be 17% in approximately 1000 patients over the age of 60 who were investigated for anemia in the primary health care center. Remarkably, in this study, 28% of patients with anemia were found to have unexplained anemia. However, the fact that all hematological diagnostic tests could not be performed in 81% of the patients was an important limitation of this study (23).

One of the most comprehensive studies investigating the frequency of anemia in the elderly population in our country was carried out by evaluating hospitalized patients retrospectively (24). Anemia prevalence was found to be 76% in 715 patients hospitalized in the

internal medicine clinic. Considering the causes of this high anemia rate, it was reported that approximately half of the patients had anemia associated with inflammation, and one third of the patients had anemia due to chronic renal failure. This has been interpreted as the results obtained in hospitalized patients cannot be generalized to the whole population. In another study conducted in our region, which included a sufficient number of patients, the frequency of anemia was reported as 7% in approximately 800 patients over the age of 60 who applied to the outpatient clinic (25). However, in this study, the presence of chronic diseases was defined as an exclusion criterion. This allowed the investigation of only nutritional anemia.

As seen in these studies (9,19-25), which we have mentioned so far, investigating the frequency of anemia in the elderly and trying to classify anemia, the rate of anemia varies between 7% and 21%. In our experience, which is one of the most comprehensive studies on this subject in Turkish society, this rate was found to be 8.5%. The rate of anemia in our elderly patients can be considered relatively low compared to some societies. The fact that more risky groups were screened in terms of anemia in some studies may have caused the incidence of anemia to appear higher. Considering the anemia classification in these studies, it has been reported that nutritional anemia and anemia of chronic disease are generally in the first place among the elderly population, but unexplained anemia is seen at rates of up to 40%. Similarly, nutritional anemia ranked first in our study, and the cause of anemia could not be explained in about a quarter of our patients. As in all studies, the lack of advanced tests such as bone marrow biopsy for the etiology of anemia was thought to be the reason for the unexplained anemia rate to appear so high in our study. It should be kept in mind that some of the unexplained anemia will be diagnosed as myelodysplastic syndrome in the long term.

The most important limitation of our study was its retrospective nature. This situation led to the conclusion that the etiology of anemia was not clearly investigated in some of the patients. Evaluation of patients who applied to the internal medicine outpatient clinic for any reason may also mean that there is a relatively bias in patient selection. Because, in daily practice, some of the patients who apply to the internal medicine outpatient clinic apply to the outpatient clinic due to comoborbid diseases. Since the frequency of anemia is expected to be higher in this group than in the whole population, this can be seen as a limiting factor in terms of reflecting the results obtained for the whole population. However, our study appears to be an impressive real-life analysis involving a fairly large geriatric population of approximately 1200 patients.

CONCLUSION

It was revealed in our study that anemia is a common health problem in elderly patients in our society, and that unexplained anemia can be seen at a substantial rate in addition to anemia due to nutritional causes and chronic diseases. The prevalence of anemia of approximately 10% in our study gives the message that anemia is an important public health problem for the elderly population and that health care providers should be careful in terms of preventive and therapeutic measures.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was approved by the Ethics Committee of the University of Health Sciences, Ankara Oncology Training and Research Hospital Ethics Committee (Date: 28.07.2021, Decision No:2021-07/1311).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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REFERENCES

1. Orimo H, Ito H, Suzuki T, Araki A, Hosoi T, Sawabe M. Reviewing the definition of "elderly." Geriatr Gerontol Int 2006; 6: 149-58.
2. World Health Organization (WHO), https://www.who.int/ageing/publications/global_health.pdf, October 2011.
3. Türkiye İstatistik Kurumu (TUIK), https://data.tuik.gov.tr/Bulten/Index?p=Istatistiklerle-Yaslilar-2020-37227, 18 March 2021.
4. Bilir N. Yaşlılık tanımı, yaşlılık kavramı, epidemiyolojik özellikler. yaşlılık ve solunum hastalıkları: TÜSAD Eğitim Kitapları Serisi; 2018: 13-31.
5. Penninx BW, Pluijm SM, Lips P, et al. Late-life anemia is associated with increased risk of recurrent falls. J Am Geriatr Soc 2005; 53: 2106-11.
6. Chaves PH, Carlson MC, Ferrucci L, Guralnik JM, Semba R, Fried LP. Association between mild anemia and executive function impairment in community-dwelling older women: The Women's Health and Aging Study II. J Am Geriatr Soc 2006; 54: 1429-35.
7. Denny SD, Kuchibhatla MN, Cohen HJ. Impact of anemia on mortality, cognition, and function in community-dwelling elderly. Am J Med 2006; 119: 327-34.
8. Penninx BW, Pahor M, Cesari M, et al. Anemia is associated with disability and decreased physical performance and muscle strength in the elderly. J Am Geriatr Soc 2004; 52: 719-24.
9. 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: 2263-68.

10. 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.
11. Camaschella C. Iron deficiency. Blood 2019; 133: 30–9.
12. Oymak Y, İlhan G. B12 vitamin eksikliği tanı ve tedavi klavuzu. Eritrosit hastalıkları ve hemogoblobin bozuklukları tanı ve tedavi klavuzu, Türk Hematoloi Derneği 2019: 1-10.
13. Devalia V, Hamilton MS, Molloy AM; British Committee for Standards in Haematology. Guidelines for the diagnosis and treatment of cobalamin and folate disorders. Br J Haematol 2014; 166: 496-513.
14. Paula G. Fraenkel; Understanding anemia of chronic disease. Hematology Am Soc Hematol Educ Program 2015; 2015: 14–8.
15. Penninx BWJH, 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.
16. 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: 3841-6.
17. Zakai NA, Katz R, Hirsch C, et al. A prospective study of anemia status, hemoglobin concentration, and mortality in an elderly cohort: the Cardiovascular Health Study. Arch Intern Med 2005; 165: 2214-20.
18. Beghé C, Wilson A, Ershler WB. Prevalence and outcomes of anemia in geriatrics: a systematic review of the literature. Am J Med 2004; 116: 3S-10S.
19. Anía BJ, Suman VJ, Fairbanks VF, Rademacher DM, Melton LJ. Incidence of anemia in older people: an epidemiologic study in a well defined population. J Am Geriatr Soc 1997; 45: 825-31.
20. 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: 925-32.
21. Tettamanti M, Lucca U, Gandini F, et al. Prevalence, incidence and types of mild anemia in the elderly: the "Health and Anemia" population-based study. Haematologica 2010; 95: 1849-56.
22. 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.
23. Michalak SS, Rupa-Matysek J, Hus I, Gil L. Unexplained anemia in the elderly - a real life analysis of 981 patients. Arch Med Sci 2019; 16: 834-41.
24. Taşar PT, Şahin S, Emgin Ö, et al. Evaluation of anemia in geriatric inpatients. Tepecik Eğit Hast Derg 2015; 25: 43-8.
25. Yildirim T, Yalcin A, Atmis V, et al. The prevalence of anemia, iron, vitamin B12, and folic acid deficiencies in community dwelling elderly in Ankara, Turkey. Arch Gerontol Geriatr 2015; 60: 344-8.