

## Incidence and factors associated with anemia among the geriatric population at a tertiary care hospital in southern India

**Authors:** P. Ashwini. Aithal<sup>1\*</sup>; A. Binti Amber<sup>2</sup>; C. Wen Hao<sup>2</sup>; H. Elang Gopalan<sup>2</sup>; S. Krishnappan<sup>2</sup>; V. Upeka Goonesinghe<sup>2</sup>; N. Kumar<sup>3</sup>

**Affiliations:** <sup>1</sup>Division of Anatomy, Department of Basic Medical Sciences, <sup>2</sup>Melaka Manipal Medical College, Manipal Academy of Higher Education, Manipal, India; <sup>3</sup>Department of Anatomy, Ras Al Khaimah College of Medical Sciences, RAK Medical & Health Sciences University, Ras Al Khaimah, UAE

### ABSTRACT

**INTRODUCTION:** Anaemia in geriatric populations poses challenges to healthcare systems worldwide. Hence, this study was done to investigate the incidence of anemia among the geriatric population of South India.

**METHODS:** Retrospective, cross-sectional study with 144 patients aged 65 years and above. Socio-demographic data and laboratory findings were recorded in a validated proforma format. Data were analyzed using SPSS.

**RESULTS:** 36.1% of the study population was anemic, and 63.9% were non-anemic. The prevalence of anemia was higher among females (36.36%) than males (35.82%). The prevalence of anemia was significantly correlated with advanced age ( $r=0.21$ ;  $p < 0.05$ ) and female sex ( $r=0.25$ ;  $p < 0.05$ ). Thirty-six patients were mild anemic (69%), 13 had moderate (25%), and 3 (6%) had severe anemia. Nutritional anemia was most common (80%), followed by hemorrhagic anemia (18%) and hemolytic anemia (2%). Among the 52 patients who were anemic, the most common comorbidities associated were Type 2 diabetes mellitus (69.2%) and hypertension (53.8%). Liver diseases were present in 5 cases (9.62%), renal insufficiency in 14 cases (26.9%), hypercholesterolemia in 5 cases (9.62%), and 6 cases (11.5%) were associated with other diseases. All the patients were managed conservatively with treatment, and anemia improved in 36.5% of cases.

**CONCLUSION:** Anaemia was frequently diagnosed in the studied geriatric population. Nutritional deficiencies were the most common cause, followed by hemorrhagic and hemolytic anemia. The impact of anemia on quality of life, recovery from illness, and functional abilities must be further investigated in future geriatric studies.

**Keywords:** Anaemia, geriatric, prevalence, comorbidities.

### INTRODUCTION

Anaemia is a clinical condition whose incidence

increases with age and is an underdiagnosed cause of morbidity in older people. Anaemia is a common health condition in which the number of red blood

**\*Corresponding author:** Dr. Ashwini Aithal P, Assistant Professor, Division of Anatomy, Department of Basic Medical Sciences, Manipal Academy of Higher Education, Manipal, India 576104, Email: ashwini.aithal@manipal.edu; **Potential Conflicts of Interest (Col):** All authors: no potential conflicts of interest disclosed; **Funding:** All authors: no funding has been sought or gained for this project; **Academic Integrity.** All authors confirm that they have made substantial academic contributions to this manuscript as defined by the ICMJE; **Ethics of human subject participation:** The study was approved by the local Institutional Review Board. Informed consent was sought and gained where applicable; **Originality:** All authors: this manuscript is original has not been published elsewhere; **Review:** This manuscript was peer-reviewed by three reviewers in a double-blind review process; **Type-editor:** Andrew (USA).

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cells (RBCs) decreases, and subsequently, the body's oxygen-carrying capacity is inadequate to meet physiological needs. The prevalence of anemia in the geriatric population and its impact on survival remains unclear [1]. The World Health Organization (WHO) defines anemia as a condition in which the hemoglobin concentration is less than 12 g/dL for women and less than 13 g/dL for men [2]. The prevalence of anemia among the older population varies widely (2.9%-61% of men and 3.3%-41% of women) depending on the community studied and the definition of anemia that is used [3,4]. Anaemia in older persons is commonly overlooked since symptoms such as weakness, fatigue, and shortness of breath are attributed to the aging process itself. Nevertheless, the decline of hemoglobin is not necessarily a result of healthy aging [5]. Anaemia can have more severe complications in older persons than in younger persons and can significantly hamper their quality of life. Appropriate early identification and subsequent interventions can help prevent such adverse outcomes. Since anemia is multifactorial, the increased comorbidity in older adults makes it challenging to establish whether anemia is a marker of disease burden or a mediator in the causal pathway leading to adverse events [6]. For the above reason, managing anemias in these people is a clinical challenge, especially when the etiology remains uncertain and/ or multiple comorbidities are present.

Previous studies have emphasized investigating anemia in young women and children, yet few studies have investigated anemia in the geriatric population in South India. There is limited data on the epidemiology of anemia among older people, which is necessary for planning interventions for controlling anemia in the geriatric population. Hence, this retrospective study aimed to investigate the incidence of anemia among the geriatric population.

## METHODS

**Study design:** The study was a retrospective, cross-sectional study.

Medical records of patients aged 65 years old and above, who visited the geriatric clinic of a tertiary care hospital during the period between January 2018 – April 2019, were collected from the medical records section of the hospital. Ethical clearance was obtained before data

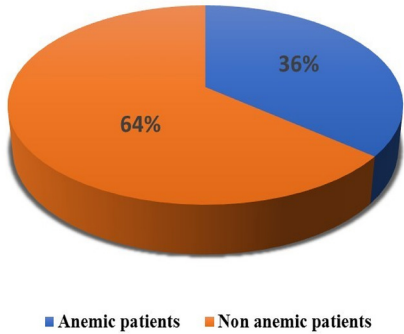
collection (IEC: 425/2019). Patients' private health information was kept confidential, and no interventions were performed. The study population was from the southern coastal region of India. Socio-demographic data and clinical profiles were recorded using a semi-structured, validated proforma. A total of 144 medical records were reviewed. Inclusion criteria included the age of 65 years or older and presentation to the outpatient geriatric clinic at the tertiary hospital. Patients below 65 years, people with any infectious diseases, and medicolegal cases were excluded from the study.

**Data analysis:** Patients were split into two groups: anemic or non-anemic. Records of patients who had anemia were then reviewed and analyzed. Spearman correlation coefficient [ $r$ ] was calculated using the values of the two variables (prevalence of anemia and age, sex) to determine whether they were associated. Grading of anemia was done as follows: Mild anemia was defined as a hemoglobin 10 g/dl to levels within normal limits; moderate anemia: hemoglobin 8–10 g/dl; severe anemia: hemoglobin 6.5–7.9 g/dl, life-threatening < 6.5 g/dl. The data was structured in Microsoft Office Excel, analyzed using SPSS (version 16.0) software, and expressed as percentages.

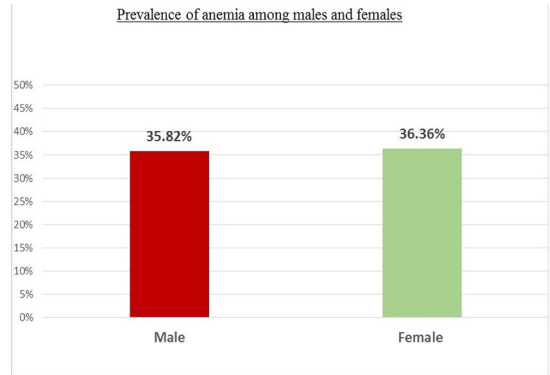
This article was approved by the Institutional Human research ethics committee (IEC: 425/2019).

## RESULTS

Of the 144 patients, 67 were male, and 77 were female. Most of them consumed a mixed diet, and no correlation was observed between socioeconomic status and the prevalence of anemia. The study revealed that 36.1% of the study population was anemic, and 63.9% were non-anemic (Figure 1). The prevalence of anemia was higher among females (Figure 2, Figure 3). The incidence of anemia was correlated with advanced age ( $r=0.21$ ;  $p < 0.05$ ) and female sex ( $r=0.25$ ;  $p < 0.05$ ). Grading of anemic patients showed that 36 patients were mildly anemic (69%), 13 were moderately anemic (25%), and 3 (6%) were severely anemic (Figure 4). No patients were identified as having life-threatening anemia. It was observed that all the patients with moderate and severe anemia were diabetic or hypertensive, whereas patients who had mild anemia were mostly only diabetic. Patients with chronic



**Figure 1: The percentage of anemic and non-anemic patients**

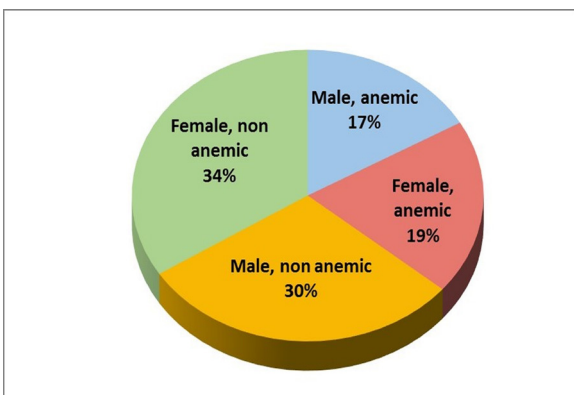


**Figure 2: The prevalence of anemia among males and females.**

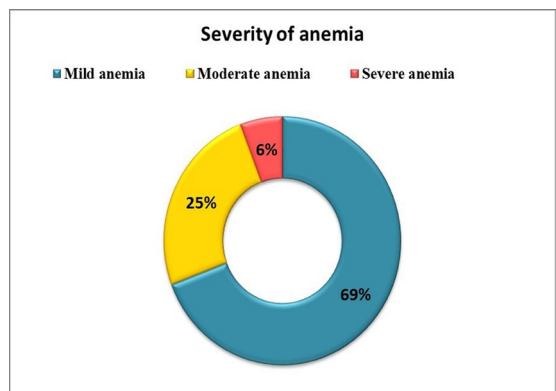
kidney disease had moderate and severe anemia, indicating that anemia is a frequent comorbidity of chronic kidney disease. The most common type of anemia was diagnosed as microcytic anemia. Based on the etiology: Iron deficiency anemia was most common (80%), followed by hemorrhagic anemia (18%), and a small proportion of patients had hemolytic anemia (2%) (Figure 5). Among the 52 patients who were anemic, most of them had Type 2 diabetes mellitus (69.2%) and hypertension (53.8%). Significant comorbidities associated with anemia in these patients were: Liver diseases in 5 cases (9.62%), renal insufficiency in 14 cases (26.9%), hypercholesterolemia in 5 cases (9.62%), and 6 cases (11.5%) were associated with other diseases (Figure 6). All the patients were managed conservatively by treatment with iron supplementation, and anemia improved in 36.5% of cases (19 patients), while the rest remained uncured during the study period.

**DISCUSSION**

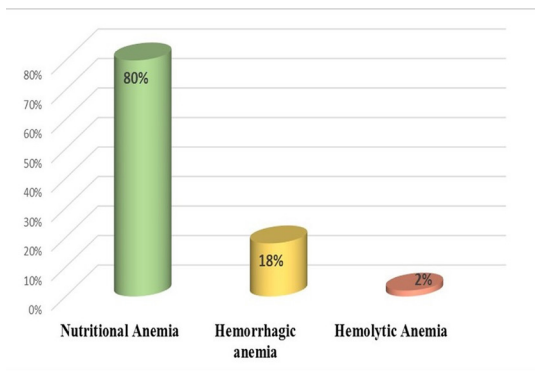
In the elderly, the variability in the reported prevalence of anemia is attributed to variables such as ethnicity, living circumstances, geographic area, and health status, thereby reflecting this population's heterogeneity [6]. Previous prospective studies have reported an overall incidence of geriatric anemia ranging from 10% to 24% [7]. In the present study, the overall prevalence of anemia was 36.1%. This finding was found to be in range with previous studies done in geriatric populations of different parts of India. Parekh et al. from western India reported a low prevalence of 3.9% [8]. Studies from different South Indian states sorted prevalence rates between 17.7% and 2% [9,10]. Agarwalla et al. reported a high prevalence of 45.5% in north-eastern India [11]. Further, other studies from northern India reported a higher prevalence of 68.8% in the older population [9,12]. Studies have shown a higher incidence of anemia



**Figure 3: The gender-wise incidence of anemia**



**Figure 4: The gender-wise incidence of anemia**

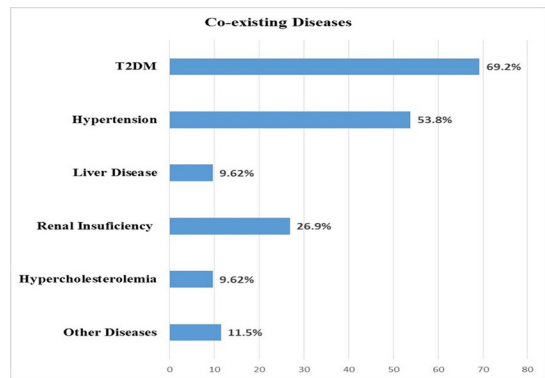


**Figure 5: The types of anemia in the studied population based on etiology**

among women in India in the reproductive age group. This might be related to many factors like multiple pregnancies, nutritional imbalance, and other gynecological problems [13]. Thus, we assume that anemia found in young females continued to exist in older women. This might be due to inadequate knowledge regarding anemia-associated health conditions and the absence of proper treatment.

Our study showed that 36 patients were mildly anemic (25%), 13 were moderately anemic (69%), and 3 (6%) were severely anemic. According to WHO, if anemia at the community level is prevalent in more than 40%, it is considered a problem of high magnitude [14]. In this study, we observed an increased prevalence of anemia with age, with the highest proportion of microcytic anemia. This suggests that other causes than iron deficiency might have contributed to the high prevalence of anemia in the studied population. Different etiologies may act together and contribute to anemias development in older age [7,15]. Based on the etiology, anemia can be classified into nutritional deficiency, hemorrhagic, and hemolytic anemia. In a small number of cases, however, no etiology is found. These patients may be diagnosed as having unexplained anemia [16].

Several studies have shown that application of WHO criteria for anemia definition is not appropriate for geriatric patients, and therefore the prevalence also varies [17]. We argue that the WHO definition should be adjusted because of the variability in normal Hb levels with age, sex, region, country, and race. However, a Hb concentration <12g/dL is commonly considered to indicate “established” anemia in the elderly population, regardless of the sex of the patient [18]. There is an ongoing



**Figure 6: The pattern of coexisting health conditions present in anemic patients**

quest for what can be considered a normal Hb reference value in older patients. Therefore, each patient must be evaluated individually, and patient-specific anemia management strategies should be employed [19].

The nutritional status of an individual has a significant influence on hemoglobin levels. Iron deficiency anemia (IDA) can occur due to inadequate iron intake, chronic blood loss or diseases, malabsorption, or a combination of all these factors and can affect development, growth, and infection resistance [20,21]. Further evaluation of the underlying etiology in the anemic patients showed that iron deficiency anemia was the most prevalent cause of anemia. This was in consensus with previous studies in India [5]. A high incidence of IDA can be attributed to the fact that most of the people recruited in the study were from rural parts of the state and were poorly educated. Thus, they are unaware of the causes and morbidity associated with anemia. Therefore, policymakers must initiate interventions and awareness in rural areas regarding the management of anemia. Iron deficiency anemia (IDA) is the most frequent cause of anemia worldwide and a global health problem [1]. Older patients with multimorbidity are at high risk of IDA because of malnutrition, leading to reduced iron absorption. IDA in such people is often multifactorial and unnoticed, as the diagnostic thresholds of laboratory parameters do not perform as well in young patients [22]. Patients with mild and moderate iron deficiency anemia can be effectively treated with oral or intravenous iron substitution. Older people need to be educated on sources of bioavailable iron, and they must be encouraged to consume iron-rich foods.

Our study found a significant association between

anemia and chronic diseases. For chronic conditions, we considered patients diagnosed during the investigation and patients already diagnosed and on medication for their disease. The majority of anemic patients had type 2 diabetes, followed by hypertension, renal disease, and cardiovascular disease, respectively. Numerous studies indicate a direct relationship between anemia and renal disease [23]. Anaemia in aging is found to be caused by a gradual decrease in erythropoietin production by the kidneys; however, the low Hb levels and consequent anemia in this age group should not be presumed to be a part of healthy aging. There is a need to adequately investigate and manage this health condition. Even at subclinical stages, diabetes is responsible for a considerable portion of cases of anemia in older adults due to the reduction of erythropoietin secretion [24,25].

Management of anemia is determined by the results of the evaluation. All cases of nutrient deficiency anemia are easily treated with replacement therapy [26]. While anemia is frequently overlooked, there is often a correctable underlying cause. There are currently no specific guidelines to help clinicians manage anemia in the elderly; nevertheless, it is clear that in the elderly, anemia should be investigated, and the underlying cause should be identified and treated whenever possible. Designing an interventional healthcare system for managing anemia plays an essential role in this strategy.

In older individuals, anemia might cause tachypnea, tachycardia, decreased exercise tolerance, muscle mass loss, and decreased physical performance [27]. Anemic individuals are more inactive and have sedentary lifestyles, which might affect physical performance. One of the most common symptoms of anemia is fatigue. It can significantly limit physical activity, decreasing muscle mass and strength and exacerbating the natural aging process [28].

The present study has limitations. This retrospective study was done mainly based on laboratory values obtained from their hospital records rather than clinical evaluations. Thus, it is difficult to say with certainty that abnormal Hb levels were caused by a chronic or an acute condition. Identification of the exact cause of anemia was also impossible because of the retrospective study design and the complexity of the data. Thus, more prospective

studies are needed to investigate the causes of anemia and its impact on functional capacity, frailty, and mortality in the geriatric population.

## CONCLUSION

Our study reports the prevalence of anemia as 36% among the geriatric population, with an occurrence of comorbidities such as diabetes mellitus, hypertension, and chronic kidney disease. The study's results will help as evidence for the incorporation of screening for anemia as one of the components of comprehensive geriatric assessment. An effective strategy for controlling anemia and strengthening preventive and rehabilitative services at primary healthcare facilities is crucial. It might improve the function, quality of life, and even lifespan of older people.

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