

Prevalence of Anemia Among Elderly Population Residing in an Urban Area of West Bengal: A Community-Based Cross-Sectional Analytical Study

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Abstract

Context: India is experiencing a rapid increase in the elderly population (aged 60 years and above) compared to the last decade. The multifactorial condition of anemia grossly influences the health-related quality of life and mortality in this age group. We aimed to estimate the prevalence of anemia and its associated factors among older adults residing in an urban area of West Bengal, India. **Materials and Methods:** The community-based cross-sectional analytical study was conducted in Kalyani Municipality, West Bengal, from March to April 2021. A simple random sampling technique was adopted to select study participants. Hemoglobin (Hb) was measured using a digital hemoglobinometer (HemoCue301), and data were collected using EpiCollect5 software. **Results:** The mean (SD) age of 457 participants was 68.9 (7.3) years with 52.1% ($n = 238$) being males, 71.9% ($n = 329$) graduates, and 64.3% ($n = 294$) currently married. The prevalence of anemia was 65% (95% CI: 60.4–69.3). The prevalence of mild (Hb 11–11.9 gm/dL in females and 11–12.9 gm/dL in males), moderate (Hb 8–10.9 gm/dL), and severe anemia (Hb <8 gm/dL) was 41.6%, 22.8% and 0.7%, respectively. Anemia was significantly associated with age group ($P < 0.01$) and sex ($P < 0.01$), with the highest prevalence in the 80 years and above age category (85.2%) and in females (71.2%). **Conclusion:** The prevalence of anemia is very high in older adults. There is an urgent need to include the elderly age group in the existing health programme for anemia, i.e., Anemia Mukht Bharat.

Keywords: Aged, anemia, India, prevalence, urban population

INTRODUCTION

Human life expectancy is increasing worldwide. By 2050, the world's population aged 60 years and above is expected to be 2 billion (22% of the total population), up from 0.9 billion (12% of the total population) in 2015, which indicates that the elderly population will be doubled globally.^[1] It is also projected that by 2050, 80% of all older people will live in low and middle-income countries.^[2] In India, there has been a sharp increase in the number of older adults, and it has been projected that by the year 2025, it will reach 158.7 million. By 2050, the number of older people will rise to about 324 million, surpassing the population of children below 14 years.^[3]

Anemia is a condition in which the number of red blood cells and their oxygen-carrying capacity is insufficient to meet the body's physiological needs.^[4] It is a common, multi-factorial

condition among the elderly and the prevalence of anemia increases with age, representing a significant health problem among older individuals.

Worldwide every fourth individual aged 60 years or above is anemic, and in India, the prevalence ranges between 21% and 92%.^[5,6] Anemia is associated with decreased functional ability/physical function, increased dementia, and increased risk of falls, morbidity, and mortality in the elderly population.^[7–9] Unfortunately, many symptoms of anemia like weakness,

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fatigue, and shortness of breath are often misdiagnosed as everyday phenomena in elderly individuals.

Recent studies in West Bengal focused on rural residents and included either elderly males or females to assess the prevalence of anemia.^[10,11] There is a sparsity of literature evaluating the prevalence of anemia in older adults residing in urban areas. Urban older adults have significantly lower successful ageing compared to rural counterparts.^[12] Also, there is a reported positive association between health and nutrition and economic prosperity. Hence, we decided to estimate anemia prevalence and its association among the non-slum-dwelling urban population residing in the Kalyani Municipality area of district Nadia, West Bengal, India.

MATERIALS AND METHODS

Study design and setting

A community-based cross-sectional analytical study was conducted in March 2021 in the All India Institute of Medical Sciences, Kalyani urban field practice area. Kalyani is one of the earliest planned cities in India and is located 50 km away from the metropolitan city of Kolkata, West Bengal. The municipality area is divided into 21 ward/block areas—all similar in socio-demographic and economic characteristics and caters to a population of around one lakh. There are two urban primary health centers and ten sub- in the municipality.

Study participants

All older adults/elders (aged ≥ 60 years) residing in the ward/block areas of Kalyani Municipality, district Nadia, West Bengal, for at least the past one year were eligible to participate in the study. The elderly with a history of blood disorders, or history of blood transfusion, or intake of iron & folic acid, vitamin B12, or deworming in the last six months were excluded from the study during the data collection.

Sample size and sampling method

Considering the expected prevalence of 18.7%,^[13] with a 95% confidence interval (CI), 20% of relative precision, and 10% of nonresponse rate, the sample size was calculated to be 474. There are 22,100 households/families (in residential complexes or flats) in the study area, and all have a unique number provided by the municipality. Around 1,112 families were listed with at least an older person, which served as the sampling frame. Study households were selected through simple random sampling using computer-generated sequences from the sampling frame.

Study tool

An interview was conducted using a structured questionnaire with two parts. The first section comprised the socio-demography, morbidity, and diet profile. Individuals taking medicines for the last year for conditions like hypertension, diabetes, chronic obstructive pulmonary disease (COPD), chronic kidney disease (CKD), coronary artery disease (CAD), and hypothyroidism were considered to suffer from chronic disease. The questionnaire was translated into the vernacular (Bengali)

and cross-checked by back translating to English. It was pretested in 30 residents and modified accordingly. Hemoglobin estimation and anthropometry measurement were done in the second section. Weight and half-arm span were taken, with height estimated from arm span for calculating body mass index (BMI).^[14,15] Hemoglobin level was assessed by a digital hemoglobinometer (HemoCue 301; HemoCue AB-hemoglobin photometer; Angelholm, Sweden), which has a sensitivity and specificity of 90% and 80%, respectively.^[16] The cuvette was filled with capillary blood, and measurement was not deferred beyond 40 seconds.^[17] The HemoCue system is based on the cyanmethemoglobin method and is stable and durable in field settings.

Data collection

Data were collected by the investigators and trained medical social workers under the supervision of resident doctors of the Department of Community Medicine and Family Medicine. It was collected house-to-house using standard infection and prevention control precautions. The next house was approached if any house was locked or the household members did not meet the inclusion criteria. The participants were contacted only once for the study, and data collection happened three times a week. If any house had more than one eligible participant, then only one of them was selected using a lottery method. So, the number of households and older adults included were the same.

Ethical approval was obtained from Institute Ethics Committee (IEC) (Reference number: T/IM-NF/Kalyani/20/09). Informed consent was taken before the questionnaire was administered to the study participants. Participants diagnosed with anemia were made aware of the variety of iron-rich food items available and advised and provided iron and folic acid tablets.

Statistical analysis

Data were collected using EpiCollect version 5.0 and analyzed using Stata version 14 (Stata Corp, College Station, TX, USA). Descriptive statistics were mean and standard deviation (SD) for continuous variables and proportions for categorical variables. Prevalence of anemia was expressed as a proportion with 95% CI. Blood hemoglobin level less than 12 gm/dL among females and less than 13 gm/dL among males was considered anemia and graded according to World Health Organization (WHO) classification.^[4] A Chi-squared test was performed to identify the factors associated with anemia. Variables with a *P* value < 0.2 were considered for regression to assess the independent effects. We used generalized linear model command with family Poisson and log link for calculating the adjusted prevalence ratio (aPR) with 95% CI. A *P* value of < 0.05 was considered statistically significant.

RESULTS

A total of 474 older adults were contacted, out of which 457 were included in the study. Rest 17 individuals refused to participate, citing preoccupied commitments as the reason, making the response rate 96.4%. The mean (SD) age was

68.9 (7.3) years, with 52.1% ($n = 238$) being male. The socio-demographic and morbidity characteristics of the study participants are described in Table 1. Of total, 71.9% ($n = 329$) were graduates, 64.3% ($n = 294$) were currently married, and 78.3% ($n = 358$) consumed nonvegetarian diet. Regarding comorbidities, 51.9% ($n = 237$) were obese ($\text{BMI} \geq 25.00 \text{ kg/m}^2$) and 72.7% ($n = 332$) suffered from some chronic disease. Hypertension was the most common disease (55.1%, $n = 252$), followed by diabetes (24.3%, $n = 111$), CAD (13.1%, $n = 60$), hypothyroidism (11.2%, $n = 51$), COPD (3.7%, $n = 17$), and CKD (1.8%, $n = 8$) [Table 1].

A total of 297 participants had anemia making the prevalence to be 65.0% (95% CI: 60.4–69.33), with 41.6% ($n = 190$) and 22.8% ($n = 104$) having mild and moderate anemia, respectively. Severe anemia was present only among the females (1.4%, $n = 3$) [Figure 1].

Advanced age and females were associated with an increased prevalence of anemia [Figure 2]. In adjusted analysis, anemia was significantly 23% (aPR 1.23, 95%CI: 1.08–1.41) more common among the females compared to males and 45% (aPR 1.45, 95%CI: 1.21–1.75) more common among 80 years and above age group compared to 60–69 years old age group [Table 1].

DISCUSSION

In the present community-based cross-sectional analytical study, we found 65% of the elderly population residing in an urban area of West Bengal to be suffering from anemia, and it was significantly more common among the females (aPR 1.23) compared to males and more common among 80 years & above age group (aPR 1.45) compared to 60–69 years age group.

According to our study results, around two-thirds of the older adults were anemic. Such high prevalence is comparable to studies conducted in old age homes of urban Delhi (68.7%) and rural communities in Uttarakhand (92.1%).^[18,19] In a similar study setting from Assam, it was found to have a lesser prevalence (20.6%) as around two-thirds of participants were males.^[20] The prevalence of anemia in the elderly was highest

among all the age groups in studies conducted across the globe, including in Malaysia and Turkey.^[21,22] Therefore, such a high burden of anemia in this age group should draw the immediate attention of policymakers. In addition, it warrants the direct inclusion of the elderly age group in national-level surveys to estimate the prevalence of anemia in this age group. We recommend including the elderly age group in the existing national program for anemia.^[23]

The prevalence of anemia increased with age; other studies have reported the same.^[24–27] We want to recommend reviewing the cut-off values for the diagnosis of anemia in the elderly age group. As the hemoglobin level decreases with age, thus age-adjusted cut-off for the diagnosis of anemia in the elderly is immediately required for assessing the actual burden of anemia.^[28] The WHO criteria for diagnosing anemia in adults was given in 1968, almost five decades older and not updated yet. There are no separate criteria for diagnosing anemia among older adults, and researchers often use the same cut-off for older adults. Several studies have shown that applying WHO criteria for anemia are inappropriate for aged patients.^[29]

Anemia is usually more common in females, and the finding also stands true for this age group.^[25]

Anemia in the elderly is multi-factorial. Evidence from various studies done on the elderly population suggests that nutritional deficiency (i.e., iron, folate or Vitamin B12) and anemia of chronic diseases account for two-thirds of the prevalence. In another third, anemia cannot be attributed to any particular cause and is labelled as “unexplained anemia”. Several age-related factors might lead to either decreased production or shortened survival of red blood cells, increasing the prevalence of anemia in this age group.^[30] Anemia of chronic diseases might be an attributable factor to the high prevalence of anemia in the present study, as 70% of the study participants had chronic diseases.

Anemia, a global public health problem, needs appropriate and timely intervention to promote health and prevent consequences. Despite its clinical importance, anemia in the elderly is under-recognized and evidence-based guidelines on

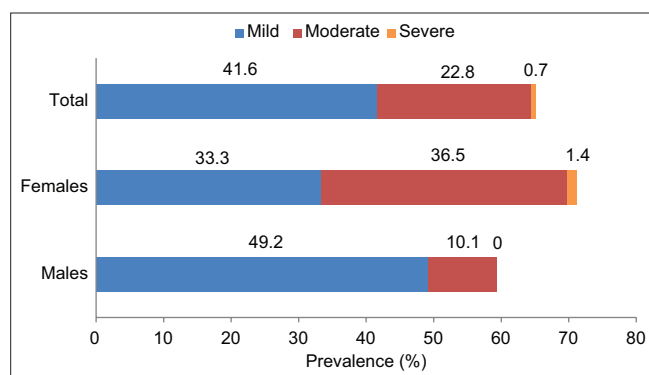


Figure 1: Stacked bar chart showing the prevalence of different grades of anemia in total and according to sex among older adults residing in an urban area of Kalyani, West Bengal, 2021 ($N = 457$)

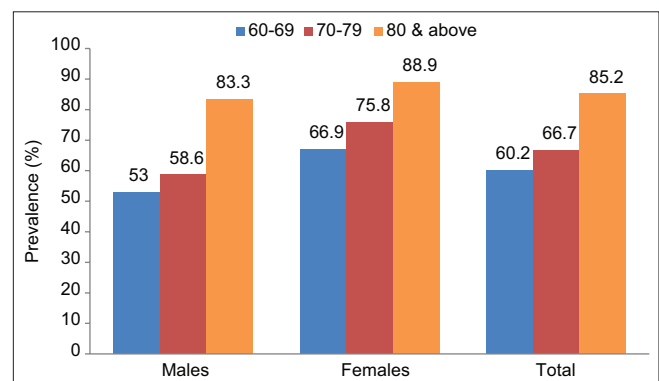


Figure 2: Clustered bar chart comparing the prevalence of anemia in different age and sex categories among older adults residing in the urban area of Kalyani, West Bengal, 2021 ($N = 457$)

Table 1: Socio-demographic and morbidity characteristics and its association with anemia among older adults residing in urban blocks of West Bengal, 2021 (n=457)

Characteristics	Total n (%) [*]	Anemic n (%) [†]	Bivariate analysis <i>P</i> [‡]	Multivariable analysis	
				aPR (95% CI)	<i>P</i> [§]
Age category (in years)			<0.01 [§]		
60-69	271 (59.3)	163 (60.2)		1	
70-79	132 (28.9)	88 (66.7)		1.11 (0.95-1.29)	0.2
≥80	54 (11.8)	46 (85.2)		1.45 (1.21-1.75)	<0.01 [§]
Sex			<0.01 [§]		
Male	238 (52.1)	141 (59.2)		1	
Female	219 (47.9)	156 (71.2)		1.23 (1.08-1.41)	<0.01 [§]
Education (years of schooling)			0.97		
No formal education	8 (1.8)	5 (62.5)			
1-12	120 (26.3)	79 (65.8)			
>12	329 (71.9)	213 (64.7)			
Marital status			0.22		
Never married	41 (9.0)	31 (75.6)			
Currently married	294 (64.3)	184 (62.6)			
Divorced/separated/widowed	122 (26.7)	82 (67.2)			
Diet			0.53		
Vegetarian	99 (21.7)	67 (67.7)			
Nonvegetarian	358 (78.3)	230 (64.3)			
BMI category (in kg/m ²)			0.64		
Underweight (<18.50)	22 (4.8)	16 (72.7)			
Normal (18.50-22.99)	111 (24.3)	68 (61.3)			
Overweight (23.00-24.99)	87 (19.0)	55 (63.2)			
Obesity (≥25.00)	237 (51.9)	158 (66.7)			

BMI: Body Mass Index, ^{*}Column percentage, [†]Row percentage, [‡]Based on Chi-squared test, [§]*P*<0.05

its management are lacking, especially from a public health perspective. Therefore, early detection of anemia in the elderly is necessary to prevent delays in diagnosing other potentially treatable adverse conditions.

The notable strengths of our study are the following: First, our study adds to the limited literature available on the prevalence and factors associated with anemia among older adults in India. The study's community-based nature, large sample size, probability sampling, and high-response rate are the added advantages. These factors enable comparisons with other elderly cohorts across India and similar settings.

However, our study has certain limitations. Since this was a cross-sectional study, a causal relationship cannot be inferred. The inclusion of only community-dwelling older adults can underestimate the prevalence of anemia as we could not include those people in old age homes or institutions. We also acknowledge that there is considerable controversial reporting on BMI as an appropriate measure for older people, and BMI may not appropriately represent the body composition of the elderly population.

CONCLUSION

The prevalence of anemia is very high in community-dwelling urban older adults. There is an urgent need to include the elderly age group in the existing health programme for anemia, i.e., Anemia Mukh Bharat.

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Ethical approval

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Conflicts of interest

There are no conflicts of interest.

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