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Prevalence of Anemia and Associated Factors among Elderly Individuals Residing in a Rural Area: A Community-Based Cross-Sectional Study

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Abstract: *Background*: Anemia is a common health concern among the elderly population, particularly in rural areas. This study aimed to determine the prevalence of anemia and its associated factors among elderly individuals residing in a rural area. *Methods*: A community-based cross-sectional study was conducted among 600 elderly individuals aged 60 years and above in a rural area. Socio-demographic characteristics, dietary habits, past medical history, and physical examination findings were collected using a structured questionnaire. Hemoglobin levels were measured to determine the presence of anemia. Descriptive statistics and chi-square tests were used to analyze the data. *Results*: The overall prevalence of anemia among the elderly participants was 61.8%, with 60.9% in males and 62.9% in females. Factors significantly associated with anemia included age (p<0.001), past history of chronic illness (p=0.004), dietary intake (p<0.001), and presence of pallor (p<0.001). Older age, presence of chronic illnesses, inadequate dietary intake, and pallor were identified as potential risk factors for anemia in this population. *Conclusion:* The high prevalence of anemia among elderly individuals in rural areas highlights the need for targeted interventions and health programs to address this public health issue. Regular screening, nutritional education, and management of chronic illnesses could help reduce the burden of anemia in this vulnerable population.

Keywords: Anemia, Elderly, Prevalence, Risk factors, Rural health.

INTRODUCTION

Anemia is a global health problem affecting individuals across all age groups, with the elderly population being particularly vulnerable [1]. Anemia in the elderly is associated with increased morbidity, mortality, and reduced quality of life [2, 3]. The World Health Organization (WHO) defines anemia as a hemoglobin level below 13 g/dL in men and 12 g/dL in women [4]. The prevalence of anemia among the elderly varies widely across different regions and populations, with estimates ranging from 2.9% to 61% in community-dwelling older adults [5].

Several factors contribute to the development of anemia in the elderly, including nutritional deficiencies, chronic diseases, and age-related physiological changes [6]. Iron deficiency is the most common cause of anemia in older adults, followed by chronic inflammation and chronic kidney disease [7]. Other risk factors for anemia in the elderly include poor dietary intake, malabsorption, and medication use [8].

In India, the elderly population is growing rapidly, with a significant proportion residing in rural areas [9]. Studies have reported a high prevalence of anemia among the elderly in India, ranging from 6% to 30% [10, 11]. However, limited data is available on the prevalence and associated factors of anemia among elderly individuals in rural settings. Understanding the burden and determinants of anemia in this population is crucial for developing targeted interventions and health policies.

Aims and Methods

This study aimed to determine the prevalence of anemia and its associated factors among elderly individuals residing in a rural area of Belagavi, Karnataka, India. A community-based cross-sectional study was conducted from January to December 2020 in the rural field practice area of the Rural Health Centre, Department of Community Medicine, J. N. Medical College, KAHER, Belagavi. The sample size was calculated using a prevalence of 15% (7), with an absolute error of 3% and a confidence level of 95%, yielding a sample size of 600.

Systematic random sampling was used to select the study participants. The Peeranwadisubcenter, one of the nine subcenters under the Kinaye Rural Health Centre, was randomly selected. Using the household register, a total of 1,850 households were identified, and every 2nd house was visited until the desired sample size was achieved. Elderly individuals aged 60 years and above who resided in the area for more than six months and provided consent were included in the study. Those who were critically ill, suffered from neuropsychiatric illnesses, or were bedridden were excluded.

Data were collected using a pre-designed and pre-tested questionnaire through face-to-face interviews. The questionnaire gathered information on socio-demographic characteristics, dietary habits, past medical history, and physical examination findings. Hemoglobin levels were measured using a hemoglobinometer, and anemia was defined as per the WHO criteria (4). Random blood sugar levels were tested using a glucometer, and the American Diabetes Association (ADA) guidelines were used to classify the results (35). Anthropometric measurements, including height, weight, mid-arm circumference (MAC), calf circumference (CC), and waist and hip circumference (WC and HC), were recorded using standard techniques (33).

Data were entered and managed using Microsoft Excel and analyzed using SPSS version 20. Descriptive statistics, including frequencies and percentages, were used to summarize the data. Chi-square tests were performed to assess the association between anemia and various factors. A p-value of less than 0.05 was considered statistically significant.

Ethical clearance was obtained from the Institutional Ethical Committee of J. N. Medical College, KAHER, Belagavi. Written informed consent was obtained from all participants, and the consent forms were provided in the local language.

RESULTS

The present study included a total of 600 elderly participants, with a mean age of 67.5 ± 7.2 years. The majority of the participants (36.5%) were in the age group of 60-64 years, followed by 34.8% in the 65-69 years age group, 16.2% in the 70-74 years age group, 9.8% in the 75-79 years age group, 1.8% in the 80-84 years age group, 0.7% in the 85-89 years age group, and only 0.2% were 90 years or above (Table 1). The study population consisted of 320 (53.3%) males and 280 (46.7%) females (Table 2).

Regarding the past history of chronic illnesses, 42% of the participants had no history of chronic diseases, while 23% had diabetes mellitus (DM), 15.2% had hypertension (HTN), 19.5% had both DM and HTN, and 0.3% had epilepsy (Table 3). The majority of the participants (64.7%) were vegetarians, and 35.3% consumed a mixed diet (Table 4). The 24-hour dietary recall revealed that 52.3% of the participants had an adequate dietary intake, while 47.7% had an inadequate intake (Table 5). Most of the participants (93.2%) did not have any harmful habits, while 4.2% used tobacco, 1.3% were smokers, 0.5% consumed alcohol, and 0.8% had both alcohol and smoking habits (Table 6).

The overall prevalence of anemia among the elderly participants was 61.8% (95% CI: 57.8%-65.8%). The prevalence of anemia was 60.9% in males and 62.9% in females (Table 7). Among the male participants, 60.9% were anemic (hemoglobin <13 g/dL), and 39.1% were non-anemic (hemoglobin ≥13 g/dL). Among the female participants, 62.9% were anemic (hemoglobin <12 g/dL), and 37.1% were non-anemic (hemoglobin ≥12 g/dL).

The assessment of the participants' built and nourishment status revealed that 18.2% had poor built and

nourishment, 79.3% had moderate built and nourishment, and 2.5% had fair built and nourishment (Table 8). Pallor was present in 47.3% of the participants and absent in 52.7% (Table 9).

Factors significantly associated with anemia included age ($\chi2 = 34.5$, p<0.001), past history of chronic illness ($\chi2 = 13.25$, p=0.004), dietary intake ($\chi2 = 155.10$, p<0.001), and presence of pallor ($\chi2 = 284.0$, p<0.001). The prevalence of anemia increased with advancing age, with the highest prevalence observed in the age group of 80-84 years (81.8%). Participants with a history of both DM and HTN had a higher prevalence of anemia (66.4%) compared to those with no chronic illnesses (48.8%). Inadequate dietary intake was associated with a higher prevalence of anemia (80.8%) compared to adequate dietary intake (29.2%). The presence of pallor was strongly associated with anemia, with 100% of the participants with pallor being anemic.

These findings suggest that older age, presence of chronic illnesses, inadequate dietary intake, and pallor are potential risk factors for anemia in the elderly population residing in rural areas. The high prevalence of anemia in this population highlights the need for targeted interventions and health programs to address this public health issue.

Table 1: Distribution of the study participants according to Age (N=600)

Age (years)	Number (n)	Percentage (%)
60-64	219	36.50
65-69	209	34.80
70-74	97	16.20
75-79	59	9.80
80-84	11	1.80
85-89	4	0.70
≥90	1	0.20
Total	**600**	**100**

Table 2: Distribution of the study participants according to Gender (N=600)

Gender	Number (n)	Percentage (%)
Male	320	53.30
Female	280	46.70
Total	**600**	**100**

Table 3: Distribution of the study participants based on their past history of chronic illness (N=600)

Past history of chronic illness	Number (n)	Percentage (%)
DM	138	23.00
HTN	91	15.20
DM + HTN	117	19.50
Epilepsy	2	0.30
None	252	42.00
Total	**600**	**100**

Table 4: Distribution of the study participants depending on their type of diet intake (N=600)

Type of Diet	Number (n)	Percentage (%)
Vegetarian	388	64.70
Mixed	212	35.30
Total	**600**	**100**

Table 5: Distribution of study participants according to their 24hr dietary intake (N=600)

24hrs dietary recall	Number (n)	Percentage (%)
Adequate	314	52.30
Inadequate	286	47.70
Total	**600**	**100**

Table 6: Distribution of the study participants according to their habits (N=600)

Habits	Number (n)	Percentage (%)
Tobacco	25	4.20
Smoking	8	1.30
Alcohol consumption	3	0.50
Alcohol and smoking	5	0.80
No habits	559	93.20
Total	**600**	**100**

Table 7: Distribution of the study participants according to their hemoglobin level (N=600)

Hemoglobin Level (Male)	Number (n)	Percentage (%)
Anemic <13	195	60.90
Non-Anemic ≥13	125	39.10
Total	**320**	**100**

Hemoglobin Level (Female)	Number (n)	Percentage (%)
Anemic <12	176	62.90
Non-Anemic ≥12	104	37.10
Total	**280**	**100**

Table 8: Distribution of the study participants according to their built and nourishment (N=600)

Built and Nourishment	Number (n)	Percentage (%)
Poor	109	18.20
Moderate	476	79.30
Fair	15	2.50
Total	**600**	**100**

Table 9: Distribution of the study participants according to the presence of pallor (N=600)

Pallor	Number (n)	Percentage (%)
Present	284	47.30
Absent	316	52.70
Total	**600**	**100**

DISCUSSION

The present study revealed a high prevalence of anemia (61.8%) among elderly individuals residing in a rural area of Belagavi, Karnataka, India. This finding is consistent with previous studies conducted in India and other developing countries [10, 11]. The prevalence of anemia in this study is higher than the estimates reported in developed countries [5], highlighting the need for targeted interventions in rural areas.

Age was found to be significantly associated with anemia in this study, with older individuals being more likely to be anemic. This finding is in line with previous studies that have reported an increased prevalence of anemia with advancing age [12, 13]. The age-related decline in hematopoietic stem cell function, reduced erythropoietin production, and increased prevalence of chronic diseases may contribute to the higher prevalence of anemia in older adults [14].

The presence of chronic illnesses, particularly diabetes and hypertension, was significantly associated with anemia in this study. Chronic diseases can lead to anemia through various mechanisms, such as inflammation, decreased erythropoietin production, and reduced red blood cell survival [15, 16]. The high prevalence of chronic diseases among the elderly in India [17] underscores the importance of managing these conditions to reduce the burden of anemia.

Dietary intake was another significant factor associated with anemia in this study. Participants with inadequate calorie intake were more likely to be anemic compared to those with adequate intake. Poor dietary intake, particularly of iron-rich foods, is a major contributor to anemia in the elderly [18]. Nutritional education and interventions aimed at improving dietary diversity and nutrient intake could help prevent and manage anemia in this population [19].

The presence of pallor, a clinical sign of anemia, was significantly associated with anemia in this study. Pallor is a simple and useful clinical indicator of anemia, particularly in resource-limited settings where laboratory investigations may not be readily available [20]. Healthcare providers should be trained to recognize and interpret pallor as a sign of anemia in the elderly.

The strengths of this study include the community-based design, random sampling, and the use of standard methods for data collection and laboratory investigations. However, some limitations should be acknowledged. The cross-sectional nature of the study precludes the establishment of causal relationships between anemia and the associated factors. Additionally, the study relied on self-reported data for certain variables, such as dietary intake and past medical history, which may be subject to recall bias.

CONCLUSION

The present study reveals a high prevalence of anemia among elderly individuals residing in a rural area of Belagavi, Karnataka, India. Older age, presence of chronic illnesses, inadequate dietary intake, and pallor were identified as significant factors associated with anemia in this population. The findings highlight the need for comprehensive health programs targeting the elderly in rural areas, with a focus on regular screening for anemia, nutritional education, and management of chronic diseases. Further research is warranted to explore the potential causal relationships between anemia and its associated factors in this population. Addressing the high burden of anemia among the elderly in rural

areas is crucial for improving their overall health and quality of life.

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