Prevalence of anemia and its association with dietary pattern among elderly population of urban slums in Kochi

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Abstract

Background: Anemia is common among the elderly and it is the reason behind their poor survival. Anemia among the elderly is consistently disregarded, which can even incite cardiovascular complexities. The risk of physical decline for the elderly with iron insufficiency is twofold than that of others in the same age. The elderly populace dwelling in urban slums is progressively influenced. Hence, the objective was to study the prevalence of anemia among elderly dwelling in urban slums of Kochi corporation and its association with the dietary pattern. Methodology: A cross-sectional study was carried out among 165 elderly (60 years of age and above), residing in urban slums of Kochi corporation. The hemoglobin level was measured using Hemocue and the dietary pattern was assessed by a structured pretested questionnaire eliciting a 7-day dietary recall. Results: The prevalence of anemia among the elderly was observed to be 60.6%, out of which 66% were females and 49% were males. The elderly females were found to be more vulnerable to anemia. Conclusion: Anemia was found to be significantly high among the elderly population in urban slums of Kochi. Regular screening and management of anemia along with dietary awareness have become the need of the hour.

Keywords: Anemia, dietary pattern, elderly, urban slum

Introduction

Populace aging is happening worldwide with both the number and proportion expanding comprehensively. As of now, there are about 500 million (7%) adults 65 years and more in the world, yet by 2030 the older populace will twofold to 1 billion (12%). Increasingly, the dominance of more established people will dwell in developing countries as fertility rates have dropped drastically and mortality has commonly diminished. For instance, there will be 370 million older adults living in China and India alone by 2030.[1] Anemia is common among the elderly and it is the reason for poor survival in the 1/3rd elderly population. Anemia among the elderly is regularly ignored, which can even prompt cardiovascular complexities. The danger of physical decrease for the elderly with iron deficiency is twofold than that of others in the same age. Nourishing iron deficiency can be remedied by investigating the dietary pattern of the populace and by rolling outfitting improvements in the eating regimen.[3] Anemia prevalence increments with increment in age. Anemia in the elderly is clinically trouble because it is related to increased morbidity and mortality. The underlying causes of anemia in the elderly can be chronic inflammation, chronic kidney disease, nutritional deficiency, undiagnosed malignant disease, or...
unexplained causes. Anemia is the most well-known dietary issue prevailing. Anemia at any age has a critical negative effect on the strength of an individual. Kerala, a state in southern India, has a sensibly solid essential social insurance framework with a decent foundation of essential wellbeing focuses. In spite of having a low per capita salary, its social improvement markers are at standard with that of many developed countries. The elderly populace living in urban slums is more influenced. Consequently, we are leading this examination to evaluate the prevalence of anemia among elderly dwelling in urban slums of Kochi corporation and its association with the dietary pattern. This will help us to devise appropriate strategies for preventing anemia in this population.

**Objective**

Primary objective - To assess the prevalence of anemia in elderly population of urban slums in Kochi.

Secondary objective - To assess the association between anemia and dietary pattern among elderly population in urban slums in Kochi.

**Subjects and Methods**

A cross-sectional study was conducted among 165 elderly people age 60 and above from purposively selected divisions of urban slums in Kochi corporation during September-November 2018. Institutional Ethical clearance was taken and informed consent was taken from the participants (Ethical clearance obtained from Institution Review Board of Amrita Institute of Medical Sciences on 20/11/2018). The sample size is calculated from the study conducted in Kavaratti Island, Lakshadweep, where the prevalence of anemia among the elderly population of age ≥60 years was 36.6%, with 20% allowable error, 95% confidence, the minimum sample size comes to 163. We have included 165 samples in this study. Study setting of our study included 65th division Manapattiparambu having 124 households, 48th division AKG Nagar with 120 households and May first road of Kochi corporation. A maximum of two elderly was interviewed from each household.

Eligible participants were those aged 60 and above who agreed to give consent to participate in the study. The population who were bedridden and mentally disabled was excluded from the study. Purposive sampling method was incorporated for the selection of samples. From the geographical center of the division, a random direction was chosen and every house on the right side in the same direction was visited until the desired sample size of 165 was obtained.

Anemia status was assessed by measuring the hemoglobin (Hb) level using Hemocue. Using a cotton ball dipped in spirit the fingertip of the study participants was cleaned. A pinprick was made on the fingertip using a sterile lancet. The first drop of blood was discarded and the subsequent drop was collected using the cartridge and was loaded into the Hemocue. Then the Hemocue reading was recorded. According to the World Health Organization (WHO), anemia is defined as Hb levels <12.0 g/dL in women and <13.0 g/dL in men, which is taken as the cut off criteria.

Dietary pattern was assessed using an interviewer-administered 7 day recall dietary pattern questionnaire from the selected population. Questionnaire included sociodemographic details, present or past history of underlying medical history, drug history, food frequency table with 7-day recall pattern included three tables i.e. iron-rich foods (table A), iron-rich food with iron absorption inhibition property (table B), non-iron rich foods with iron absorption inhibition property (table C) with frequency of intake recorded as frequency of intake per week, per day how many times and one time how many servings and finally total servings were counted and categorized for further statistical analysis.

Data obtained were compiled, tabulated, and analyzed. Descriptive statistics were computed with percentages, mean, and standard deviation. Chi-square test and multivariable analysis were applied to test the association of factors considered with anemia.

**Results**

The study included 165 elderly from urban slums in Kochi, Kerala, with a mean age of 66.21 years, which included 110 females and 55 males. The sociodemographic details of the study population are shown in Table 1.

It was observed that 66% of the elderly females were anemic and the rest 49% were anemic. The prevalence of anemia among the elderly was observed to be 60.6%, out of which 66% were females and 49% were males. The elderly females were found to be more vulnerable to anemia and it is shown in Figure 1 below;

Bivariate analysis (Chi-square test) showed a significant association between anemia, sex, and dietary pattern of the elderly. The females were observed to have a significantly higher prevalence of anemia ($P = 0.032$). Dietary habits, such as lack of consumption of groundnut ($P = 0.001$), dates ($P = 0.006$),

| Table 1: Sociodemographic data |
|------------------------------|
| **Variable**                  | **Proportion** |
|------------------------------|----------------|
| 1. Socioeconomic status       |                |
| APL                          | 65.5%          |
| BPL                          | 34.5%          |
| 2. Sex                       |                |
| Female                       | 66.7%          |
| Male                         | 33.3%          |
| 3. Marital status            |                |
| Married                      | 89.7%          |
| Unmarried                    | 1.2%           |
| Widower                      | 9.1%           |
| 4. Religion                  |                |
| Hindu                        | 29.1%          |
| Christian                    | 26.7%          |
| Muslim                       | 44.2%          |
green spinach \( (P = 0.003) \), beans \( (P = 0.022) \), and skipping dinners \( (P = 0.029) \) were found to be significant risk factors for developing anemia among elderly [Table 2].

On multivariable analysis (regression), it was observed that females were found to be more vulnerable for anemia \( (P = 0.048) \). The lack of consumption of groundnuts \( (P = 0.004) \), dates \( (P = 0.003) \), green spinach \( (P = 0.002) \) was observed to be independent risk factors for the development of anemia. Absence of Sardine \( (P = 0.003) \), adjusted odds ratio = 0.112) in the diet was found to be a protective factor for the development of anemia [Table 3].

### Discussion

Overall, nutrition of India improved at a rapid pace[4] still the prevalence of anemia among various age groups persist, especially among the elderly were the health is most neglected. In India, many families are still supported by the elderly of the family. Healthy well-nourished adults are important as productive supporters of the family.[5] The present cross-sectional study conducted in Urban slums of Kochi recorded a high prevalence in anemia among the elderly population. According to a study on “A systematic analysis of global anemia burden from 1990 to 2010” published in blood journal, females had a higher prevalence of anemia than males in virtually all regions, especially Central Asia and Asia Pacific.[6] In our study, the prevalence of anemia among the elderly was 60.6%, a study conducted in the elderly in Chandigarh showed 68.2% prevalence in anemia[7] and study in Tamil Nadu showed 52.5% prevalence in anemia.[8] Similar study conducted by Renjini et al., in Kerala at old age homes, the prevalence of anemia was 73.9% (34/46) among males and 77.6% (45/58) among females. In this study, Renjini et al. explained older age group malnutrition as multifactorial and determined by various social, physiological, and psychological changes with aging, social isolation, financial instability, and food insecurity.[9] Whereas a study in Kavaratti Island, Lakshadweep showed anemia prevalence of 36.6%, which was lower than the prevalence from our study.[10] According to a study conducted by Bhage and coworkers, it addresses anemia as a typical worry in geriatric wellbeing and its occurrence and predominance are hazy. Estimates of anemia prevalence reported in the articles reviewed range from 2.9% to 61% in elderly men and from 3.3% to 41% in elderly women. Whereas anemia is related to manifestations such as weakness and fatigue and in severe cases can even lead to congestive heart failure. The study recommended future research to identify significance of aging

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**Table 2: Bivariable analysis shows risk factors associated with anemia**

| Variable  | Category                  | \( P \)  | Odds ratio | 95% CI of odds ratio |
|-----------|---------------------------|---------|------------|----------------------|
|           |                           |         | Lower      | Upper                |
| 1. Sex    | Female                    | 0.032   | 2.046      | 1.057 3.960          |
| 2. Groundnut | No consumption            | 0.01    | 5.216      | 1.778 15.302         |
| 3. Dates  | No consumption            | 0.006   | 3.917      | 1.405 10.915         |
| 4. Green spinach | No consumption       | 0.003   | 2.842      | 1.418 5.697          |
| 5. Beans  | 0 to 2 serving size       | 0.022   | 2.154      | 1.109 4.183          |
| 6. Dinner | No consumption of dinner  | 0.029   | 7.910      | 0.996 62.822         |
| 7. Sardine| No consumption            | 0.087   | 0.434      | 0.163 1.152          |
| 8. Meat   | 0 to 1 serving size       | 0.173   | 1.552      | 0.824 2.926          |
| 9. Pulses | 0 to 6 serving size       | 0.173   | 1.547      | 0.885 2.898          |
| 10. Hypertension | Yes                    | 0.103   | 1.795      | 0.084 3.645          |
| 11. Marital status | Married               | 0.053   | 0.297      | 0.082 1.079          |

**Table 3: Multivariable analysis -regression shows independent risk factors associated with anaemia**

| Variable  | Category                  | \( P \)  | Adjusted odds ratio | 95% CI odds ratio |
|-----------|---------------------------|---------|---------------------|-------------------|
|           |                           |         | Lower               | Upper             |
| 1. Sex    | Female                    | 0.048   | 2.125               | 1.007 4.486       |
| 2. Groundnut | No consumption            | 0.004   | 6.811               | 1.849 25.093      |
| 3. Sardine| No consumption            | 0.003   | 0.112               | 0.027 0.469       |
| 4. Dates  | No consumption            | 0.003   | 6.910               | 1.916 24.921      |
| 5. Green spinach | No consumption       | 0.002   | 3.545               | 1.609 7.810       |
or age-related ailments on the pathogenesis of iron deficiency.

Jack M Guralnik, in his study conducted among the elderly in US, shows evidence for the high prevalence of anemia among elderly. The prevalence of anemia in women doubles—10% to 20%—from the 75- to 84-year-old to the 85 years and older age group,[13] which is similar to our study showing an increased prevalence of anemia among female elderly. Similar results are seen in a study by Zakai NA showing an increased prevalence of anemia among women.[13] Carmel, in their studies, had discussed that anemia tends to be more severe in the elderly as compared to adults.[13] Various other studies show similar results.[14-16] According to a study conducted by Marshal E Salive on anemia and hemoglobin in older people, they concluded that the decline of hemoglobin and associated expanded weakness with age is not a consequence of “normal ageing” so the recognition of anemia in an older person should prompt appropriate clinical consideration.[14] According to the review article by Kaur et al., in older age, the physiological decline for food intake is very common resulting in nutritional deficiencies. The major risk factors for these severe chronic diseases and deteriorating age-related health are these severe dietary deficiencies.[15] From our study, we concluded the influence of diet on anemia, such as intake of groundnut, beans, dates, green spinach, etc., are supposed to prevent development of anemia, similar study on the comparison of nutritional profile and prevalence of anemia conducted in Punjab shows a positive correlation between hemoglobin level and intake of cereals, pulses, and green leafy vegetables.[16] A study conducted in Japan by Imai et al. were males with the highest tertile intake of animal protein had significantly lower anemia risk than those with the lowest tertile intake, whereas in our study we did not get any statistical significance related to intake of animal protein.[19]

**Conclusion**

Anemia is a major health problem of the elderly which is often neglected. It was found to be higher among elderly females and it was mostly due to inadequate dietary intake. Therefore, there is a need for creating nutritional awareness among the elderly especially among those residing in the urban slum areas. Therefore, family physicians are often in close contact with the elderly play a key role in the early diagnosis and treatment of anemia among them.

**Recommendations**

There is a need to initiate specific public health action for screening and prevent anemia among the elderly. Appropriate awareness classes regarding the nutrition should be given to elders as well as their family members.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Limitations of the present study**

Recall bias would have happened while taking the 7 days recall dietary pattern data.

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**Conflicts of interest**

There are no conflicts of interest.

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