

Original Research Article

A cross-sectional single-centre study of anaemia in the elderly

Simon Uriah¹, Ununuma Oguzor^{1*}, Tondor Cleopatra Uzosike², Hannah E. Omunakwe³

¹Department of Family Medicine, ²Department of Community Medicine, ³Department of Haematology and Blood Transfusion, Rivers State University Teaching Hospital, Port Harcourt, Nigeria

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*Correspondence:

Dr. Ununuma Oguzor,

E-mail: nunus_oguzor@yahoo.com

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ABSTRACT

Background: The geriatric population is increasing globally, and anaemia in the elderly is associated with increased morbidity and mortality. The Anaemia in Elderly study (ANiE study) aimed to assess the prevalence, associations and severity of anaemia in elderly patients attending the outpatient clinics at Rivers State University Teaching Hospital.

Methods: This was a prospective cross-sectional study of consenting patients, 60 years and older, attending the outpatient clinics in our hospital. A blood sample was collected for full blood count, blood glucose, serum creatinine and HIV serology. A data collection tool was used to collect data on comorbidities, occupation and income among others. Descriptive analysis and logistic regression were done to determine factors associated with anaemia in elderly patients in the outpatient clinics.

Results: A total of 288 patients consented to participate, anaemia was prevalent in 101 (35.1%) of the participants, there was no difference in the prevalence between males and females, the mean PCV was $38.33 \pm 1.33\%$, the majority of the anaemic patients had mild anaemia 46 (45.5%). Being a patient on follow-up visit to the hospital, the average monthly income and employment status were significantly associated with the occurrence of anaemia.

Conclusions: Anaemia according to the WHO definition was prevalent in 35.1% of elderly patients attending the outpatients' clinics in the hospital. Factors associated with anaemia were employment status and average monthly income. It is important to identify patients at risk and provide appropriate care to prevent further morbidity and mortality.

Keywords: Anaemia, Elderly, Teaching hospital

INTRODUCTION

The geriatric population is expected to show an alarming rise by the end of the 21st century posing fresh challenges to the healthcare provider and putting additional constraints on meagre health resources.¹

Globally, demographic patterns across all nations have changed considerably over the past century, recognized as an achievement for humanity.² Defining 'older' persons, however, has been challenging across low-, middle- and high-income nations, compelling the United

Nations to establish the definition of 'older' persons as those persons over the age of 60 years.^{3,4}

As the global population of older persons is estimated to increase from 11% in 2000 to 22% in 2050, population ageing will transform all aspects of society, ranging from changes in economic security, employment opportunities, family structure, housing resources, and transportation services.

Anaemia is common in the elderly and its prevalence increases with age.^{5,6} In elderly persons, the aetiology of anaemia differs sufficiently from the aetiology of

younger adults to warrant considering anaemia in geriatric persons as a distinct entity. Using World Health Organization criteria for anaemia (haemoglobin of less than 12 gm per dl in women and less than 13 g per dl in men), the prevalence of anaemia in geriatric patients has been found to range from 8 to 44 per cent, with the highest prevalence in men 85 years and older.⁷ Anaemia is associated with an increased risk of hospitalization and death in community-dwelling older adults.⁸ It is associated with poor quality of life and increased morbidity and mortality.⁹

This study aimed at identifying the prevalence, associations, and severity of anaemia in the elderly attending the outpatient departments at Rivers State University Teaching Hospital, and its associations.

METHODS

The study was a cross-sectional hospital-based study which was carried out in the Family medicine, Surgery, Gynaecology and Surgery outpatient clinics of Rivers State University Teaching Hospital from November 2021 to February 2022. Ethical clearance to carry out this study was obtained from the Health Research Ethics Committee of Rivers State University Teaching Hospital. Consenting older patients aged 60 years and above visiting the out-patients clinic were counselled and entered into the study. However, those that had received a blood transfusion, were on chemotherapy in the past 12 weeks and very frail elderly patients were excluded from the study.

Sampling technique

Systematic random sampling was used to select patients. The average daily attendance of elderly patients from the outpatient clinics at Rivers State University was derived from the medical records department and the hospital's electronic health records. A sampling interval of 5 was used to systematically select subjects who were recruited to participate in the study. Every fifth elderly was invited to participate in the study.

The first participant was selected by simple random sampling from the list of elderly patients who registered to attend a clinic for that day and this was done in all the clinics.

Any participant who did not meet the inclusion criteria or consent to the study, that participant was skipped and the next fifth eligible consenting participant was selected until the recommended sample size was recruited. Informed consent was obtained and data was collected from the participants who met the inclusion criteria by an interviewer-administered method.

The participants were counselled and reassured about confidentiality and the process for sample collection.

Study instrument

A pretested structured questionnaire was used for data collection. The data collection tool consisted of three sections. Section A, collected data on the socio-demographic information of the participants, including age, sex, marital status, family size, employment status and monthly earnings. Section B, collected data on self-reported comorbidities including; diabetes, hypertension, chronic kidney disease, cancers and HIV.

Section C collected data on lifestyle practices such as smoking, alcohol intake, physical inactivity, stress, fruit consumption and high-salt diet.

Physical measurements

A mechanical bathroom weighing scale was used to determine the weight of participants after a daily calibration was done with a known weight, and rounded up to the nearest 0.5kg, a stadiometer was used to measure the heights of participants and a sphygmomanometer will be used to measure the blood pressure of participants.

Laboratory measurements

After obtaining informed consent, 8ml of venous blood was collected aseptically from the anterior cubital fossa and aliquoted to EDTA, lithium heparin and fluoride oxalate bottles and sent to the laboratory. The samples were assessed for the full blood count and red cell indices, fasting blood glucose, creatinine levels, and HIV status in the hospital's laboratory.

Data analysis

Data were analysed using IBM Statistical Package for Social Sciences (SPSS) version 22. The Socio-demographic variables were presented in tabular forms. Categorical variables were expressed as frequencies and proportions and the differences in proportions were compared using Chi-Square statistics among patients with and without anaemia. The Spearman correlation coefficient was used to assess the correlation between clinical and biochemical parameters with the haemoglobin level. A P value of $p \leq 0.05$ was considered statistically significant for all the tests, a Confidence Interval (CI) of 95% was set.

RESULTS

A total of 288 participants were assessed in this study. Most of the respondents 188(65.3%) were between the age of 60-69 years. There were more females 162 (56.3%) compared to males 126 (43.8%), the majority respondents were married 246 (85.4%), were unemployed 283 (98.3%), and came to the hospital for a follow-up visit 247 (85.8%) as seen in Table 1.

Most participants were overweight 187 (64.9%), 12 (4.2%) were underweight and 89 (30.9%) had normal weight. Hypertension was the most common comorbid condition the patients presented to clinics with, there were more patients with stage 2 hypertension 191 (66.3%) (Table 2).

The mean packed cell volume of our participants was 38.33±1.33%. Table 3 shows the prevalence of anaemia, its severity and morphological prevalence among the participants.

About 101 (35.1%) of the participants had anaemia. Mild anaemia was observed to occur in up to 46 (45.5%), moderate anaemia occurred in 35 (34.7%) and severe anaemia was observed in 20 (19.8%) of the anaemic respondents. The commonest morphological type of anaemia was normocytic normochromic anaemia in 44 (49.4%) participants, followed by microcytic hypochromic anaemia in 41 (46.1%) and macrocytic anaemia in 4(4.5%) of the participants.

When the severity of anaemia was analysed by age group among the participants, mild anaemia was most prevalent in the 65-69-year age group, moderate anaemia was most prevalent in the 70-74-year age group and severe anaemia was most prevalent in the group aged 75 years and above (Figure 1). Anaemia was statistically significantly associated with employment status and the average income as seen in Table 4.

Table 1: Sociodemographic characteristics.

Variable	Frequency (%) n= 288	Mean± standard deviation
Categories		
Sex	Male	126 (43.8)
	Female	162 (56.3)
Age (years)	60-69	188 (65.3)
	≥70	100 (34.7)
Mean age (years)		67.31±7.156
Marital status	Single	2 (0.7)
	Married	246 (85.4)
	Widow	34 (11.8)
	Cohabit	4 (1.4)
	Divorced	2 (0.7)
Marital status (merged)	Single	38 (13.2)
	Married	250 (86.8)
Employment	Employed	5 (1.7)
	Unemployed	283 (98.3)
Reason for visiting clinic	Follow-up	247 (85.8)
	New consultation	41 (14.2)
Average monthly earning	None	283 (98.3)
	≥135,000	5 (1.7)

Table 2: Medical history of patients.

Variable	Frequency (%), n= 288	Mean±standard deviation
Categories		
Comorbid conditions multiple responses, n= 317	Diabetes mellitus	79 (27.4)
	Hypertension	170 (59.0)
	CKD	4 (1.4)
	Cancer	8 (2.8)
	HIV	56 (19.4)
	Medication currently taking	Anticancer only
Antidiabetic only		56 (19.4)
Antihypertension/diabetes		22 (7.6)
Antihypertension only		145 (50.3)
Antiretroviral drugs		46 (16.0)
Antiretroviral/hypertensive		7 (2.4)
Antiretroviral/diabetic		3 (1.0)
Hypertension Status	Normal	13 (4.5)
	Pre-HTN	41 (14.2)
	HTN Stage 1	43 (14.9)
	HTN Stage 2	191 (66.3)
BMI Classification	Underweight	12 (4.2)
	Normal	91 (31.6)
	Overweight	62 (21.5)
	Obese	123 (42.7)
HIV status (n = 287)	Positive	33 (11.5)

Continued.

Variable	Frequency (%), n= 288	Mean±standard deviation
Fasting blood sugar (Mmol/L)	Negative	254 (88.5)
	Hypoglycaemic	29 (10.1)
	Normal	105 (36.5)
	Pre-diabetes	51 (17.7)
	Diabetes	103 (35.8)
Mean fasting blood sugar		6.60±1.772

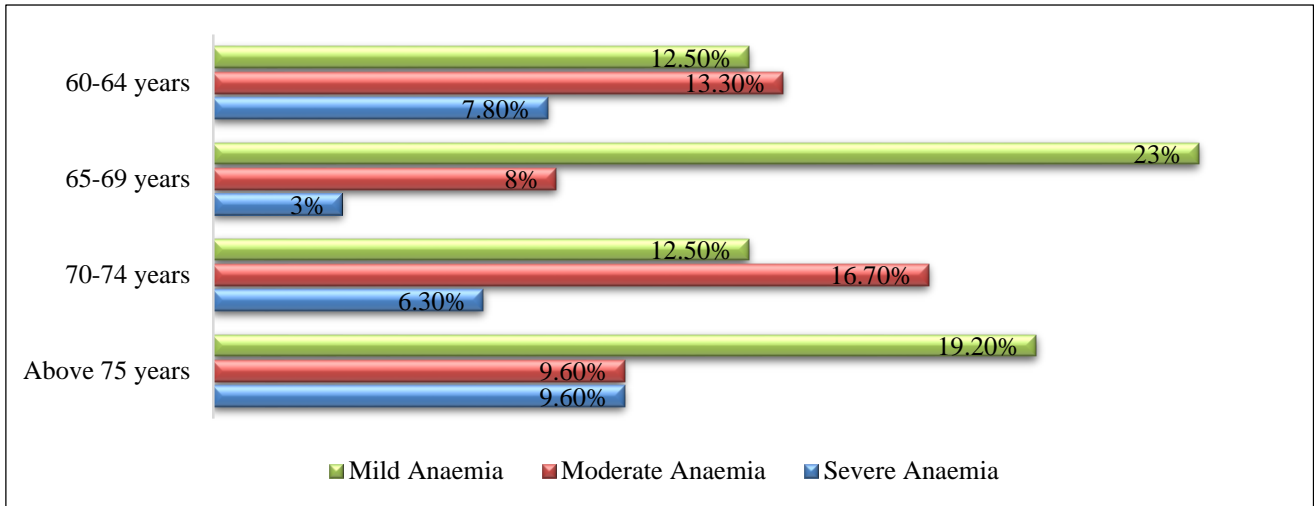


Figure 1: Severity of anaemia by age group.

Table 3: Anaemia prevalence, severity and morphology.

Variable	Frequency (%), n = 288	Mean±Standard Deviation
Categories		
Anaemia status	Anaemic	101 (35.1)
	Normal	187 (64.9)
Anaemia classification n = 101	Mild	46 (45.5)
	Moderate	35 (34.7)
	Severe	20 (19.8)
Mean PCV		Male: 38.11±1.342 Female: 38.48±1.326 Total: 38.33±1.332
MCV/MCH classification of anaemia, n = 89	Hypochromic microcytic	41 (46.1)
	Normochronic normocytic	44 (49.4)
	Macrocytic	4 (4.5)
Mean MCV		85.74±1.412
Mean MCH		26.80±1.019

Table 4: Factors associated with anaemia among study population.

Variable	Anaemia status		Test of association
	Anaemic	Normal	Chi-square
Sex			
Male	49 (48.5)	77 (41.2)	0.231
Female	52 (51.5)	110 (58.8)	
Age (years)			
60-69	64 (63.4)	124 (66.3)	0.617
≥ 100	37 (36.6)	63 (33.7)	

Continued.

Variable	Anaemia status	Test of association
Marital status (merged)		
Single	10 (9.9)	28 (15.0)
Married	91 (90.1)	159 (85.0)
Employment		
Employed	4 (4.0)	1 (0.5)
Unemployed	97 (96.0)	186 (99.5)
Average monthly earning		
None	97 (96.0)	186 (99.5)
≥ 135,000	4 (4.0)	1 (0.5)
Comorbid conditions		
Diabetes mellitus	24 (23.8)	55 (29.4)
Hypertension	64 (63.4)	106 (56.7)
CKD	2 (2.0)	2 (1.1)
Cancer	3 (3.0)	5 (2.7)
HIV	20 (19.8)	36 (19.3)
Reason for visiting the clinic today		
Follow up	86 (85.1)	161 (86.1)
New case	15 (14.9)	26 (13.9)

DISCUSSION

Anaemia is a critical clinical problem in the elderly population and is known to be associated with increased morbidity and mortality. This institutional-based cross-sectional study found that the prevalence of anaemia in elderly patients visiting outpatient departments was 35.1%, being a patient on follow-up to the hospital, monthly earning and employment status were found to be strongly associated with ANiE. The prevalence of anaemia in this study is comparable to the prevalence reported in Malaysia by Krishnapillai et al (35.3%), and 36.7% reported from Reykjavik, Iceland.^{10,11} Although it is higher than 27.3% reported by Adewoyin in a University Teaching Hospital in Nigeria, and 29% as reported by Nakashima et al from Brazil.^{12,13} Our finding is lower than 54.5% as reported by Melku et al from Gondor in Ethiopia.¹⁴ It is also lower than the prevalence reported by Tay and Ong (57.1%), and Sahin et al (54.9%) even though the study design and the criteria to define the population and anaemia are different from our study, as Tay and Ong study was retrospective in elderly hospitalized patients aged 65 and above year and the anaemia was not defined according to WHO criterion.^{15,16} Our findings are higher than the prevalence reported by Sgnaolin et al (12.8%), and Bang et al (8.33%).^{17,18} The possible reason for the difference may also be linked to the differences between the populations studied. In this study, the participants were elderly patients who presented for outpatient care, whereas in the case of Nakashima et al, Sgnaolin et al, and Bang et al studies, the participants were institutionalized in long-term care and community-dwelling elderly people, who were assumed to be healthy; thereby the prevalence of anaemia is low.^{13,17,18} This can also be due to the differences in

nutritional and environmental factors across the population studied.

The finding from our study showed that most of the patients had mild anaemia, comparable to the report by Jain et al where 45.33% were mildly anaemic, 33.33% were moderately anaemic and 21.33% were severely anaemic.¹⁹ The severity of anaemia in this study reveals that males aged above 75 years had severe anaemia while mild anaemia was observed in the females aged 60-64 years. The difference in the severity of anaemia for men and women can be explained by the fact that in each decade beyond the age of 30, the concentration of free and bioavailable testosterone declines sharply in males. This negatively impacts the enhanced metabolic processes of the bone marrow. As testosterone level decreases with ageing, the rate of erythropoiesis tends to be declined and predispose men to increased risk of anaemia.²⁰ In contrast to elderly men, the postmenopausal estrogen, which acts as an inhibitor of erythropoiesis, declines gradually as women age.²¹ This in turn would decrease the risk of anaemia in elderly women as compared to men.

In our study, employment status and average monthly income were significantly associated with anaemia. The majority of the respondents were unemployed and had no monthly earnings and this finding was similar to a study amongst an elderly population in India where moderate and severe anaemia were found to be significantly higher among subjects who were unemployed.²² Previous studies of anaemia also demonstrate that higher levels of wealth are generally associated with a lower prevalence of anaemia in LMICs.²³

The limitations of our study were mainly methodological due to the study's cross-sectional design. The data were exclusively hospital-based; thus, they may not offer an accurate representation, which limits the study's generalization.

CONCLUSION

In conclusion, the prevalence of anaemia in the elderly in this study is high and progresses in older age groups. This progression is more pronounced in men than in women in the oldest cohort. Being unemployed and having no monthly income were the strongest predictors of the risk of anaemia. This finding from our study shows a strong relationship between the socioeconomic status and Anaemia in the elderly (ANiE). Clinicians in primary practice should look out for Anaemia in the elderly (ANiE) and families and health systems should provide the necessary support for geriatric patients to prevent anaemia.

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