

Prevalence of anemia among the geriatric population attending a tertiary care hospital in Kerala

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Abstract- According to WHO, anemia is a condition in which the red blood cells count or the haemoglobin content is lower than normal. Prevalence of anemia varies from 2.9-61% in men and 3.3-41% in women. This wide variation depends on the community in which the study is held and the cut-off value used for evaluating anemia. People residing in well-developed countries show a prevalence of anemia in old age that is comparable to the general population, whereas old age population from a lower socioeconomic strata show a higher incidence of anemia compared to the general population.

Aim- In this study, we aim to find the prevalence of anemia among old age patients in Mukkam,Kerala.

Method- A cross –sectional study was carried out from the patients above 60 years of age attending the out-patient department of a tertiary care hospital during the month of January 2023. Total of 314 subjects were included in this study.

Result- Our study shows a 36.9% prevalence of anemia among old age population with no coexisting comorbidities.

Conclusion- Although many programmes have been initiated by the Government to ensure nutritional adequacies, the increasing occurrence of normocytic normochromic anemia need to be studied into and a revised cut-off for anemia has to be introduced for the geriatric population.Screening for anemia at a primary health care level needs to be continued and early detection and correction of anemia has to be done.

Keywords- Anemia, Prevalence, screening

I. INTRODUCTION

According to World Health Organisation (WHO), anemia is a condition in which the red blood cells count or the haemoglobin content is lower than normal.⁽¹⁾ As we attain a remarkable rise in life expectancy in India, the prevalence of anemia in old age has also risen. As age progresses, the ability of the human body to absorb essential nutrients and synthesize hematopoietic cells decreases. Anemia in old age can lead to impairment of cognitive abilities along with physical ability deterioration, with increased morbidity and mortality if left untreated^(2,3)

Although anemia is fairly prevalent in the elderly population, it has been found to be missed in routine clinical examinations. Untreated or refractory anemia is an independent risk factor for neurovascular and cardiological complications. This emphasizes the need for the detection of anemia at the primary care level. Prevalence of anemia varies from 2.9-61% in men and 3.3-41% in women.^(4,5)

This wide variation depends on the community in which the study is held and the cut-off value used for evaluating anemia. People residing in well-developed countries show a prevalence of anemia in old age that is comparable to the general population, whereas old age population from a lower socioeconomic strata show a higher incidence of anemia compared to the general population.

It has been projected that by 2050, the population of people aged 60 years or above will be around 2 billion, which shows a doubling compared to the 0.9 billion population estimated in 2015.⁽⁶⁾ It is also opined that 80% of the older population will live in low and middle-income nations.⁽⁷⁾

WHO defines anemia as hemoglobin content greater than or equal to 13gm/dl in men and 12gm/dl in women.⁽⁸⁾

The same cut-off values are being used for the older age group although there have been opinions that an alternative definition may be adopted. The most common cause of anemia in old age has to be estimated to be due to nutritional deficiencies, mainly iron deficiency anemia. In general, hemoglobin levels are significantly low in old age compared to the general population, the exact cause of which is unclear.

In this study, we aim to find the prevalence of anemia among old age patients in Mukkam,Kerala.

II. MATERIALS AND METHOD

Study area: The study was conducted in a tertiary care hospital of an urban population in Kerala, India.

Study design and study period: A cross –sectional study was carried out from the patients above 60 years of age attending the out-patient department of a tertiary care hospital during the month of January 2023.

Sample size:

Sample size was calculated using the following formula:

$$N = (Z_{\alpha/2})^2 \cdot pq$$

$$d^2$$

Where $Z_{\alpha/2}$ =Critical value at 5% level of significance (1.96)

p=prevalence of anemia

q=24%

d=absolute error (7%)

Total of 314 subjects were included in this study.

Inclusion criteria: Patients above 60 years of age was included in the study.

Exclusion criteria: Patients with coexisting co morbidities like hypertension, diabetes mellitus , liver and renal diseases were excluded from the study.

Study protocol: Blood samples were sent to be processed and evaluated by Auriba ABX Penta xlr hematology analyser. Complete Blood Count (CBC) findings were obtained and peripheral smears were prepared and evaluated.

Data analysis: Data was tabulated and analysed in Microsoft Excel.

Prevalence of anemia among the selected study population was estimated and the anemic cases were further classified as mild, moderate or severe based on the WHO classification.⁽⁹⁾ Table 1 shows the grading of anemia, according to WHO.

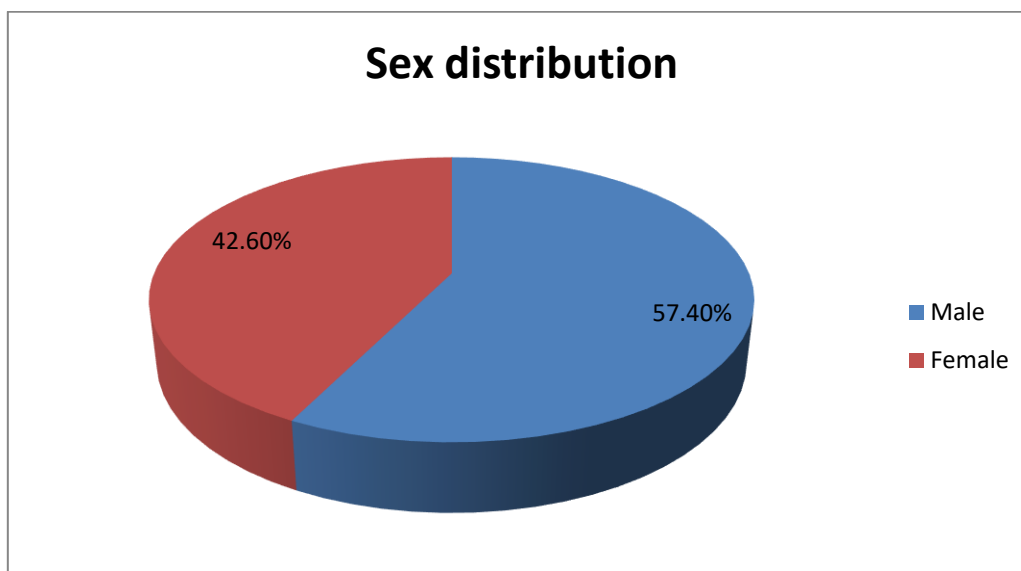
Table 1: Grading of anemia

Grading of anemia	Hemoglobin levels
Within normal limits(Grade 0)	≥ 12 gm/dl
Mild(Grade 1)	10-11.9g/dl
Moderate(Grade 2)	7.1-9.9g/dl
Severe(Grade 3)	< 7 g/dl

III. RESULTS

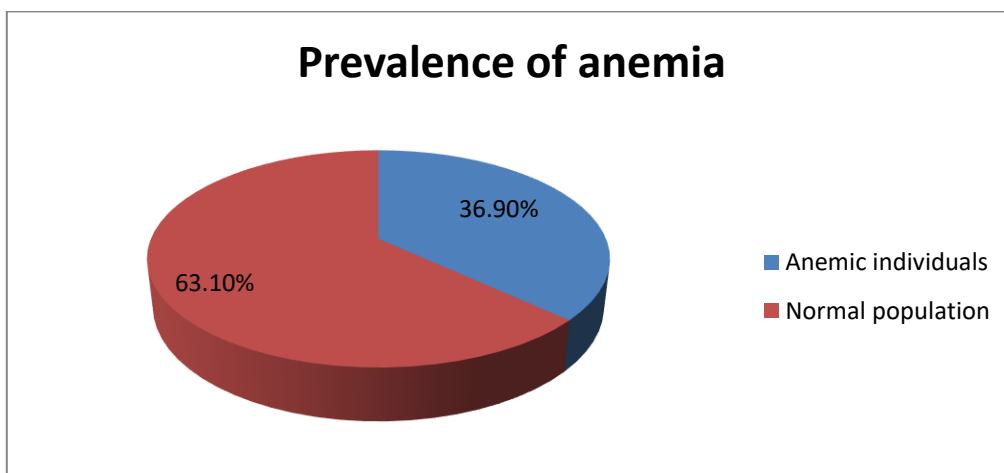
Out of the 314 subjects included in the study, 134 subjects were females, amounting for 42.6% of the study population.180 males were included in the study. (Figure 1)

Figure 1: Sex distribution of the study population



The age of the study population ranged from 60-93 years of age. Prevalence of anemia among the 314 subjects studied was 36.9% with 198 subjects showing hemoglobin values 12g/dl or greater (Figure 2)

Figure 2: Prevalence of anemia

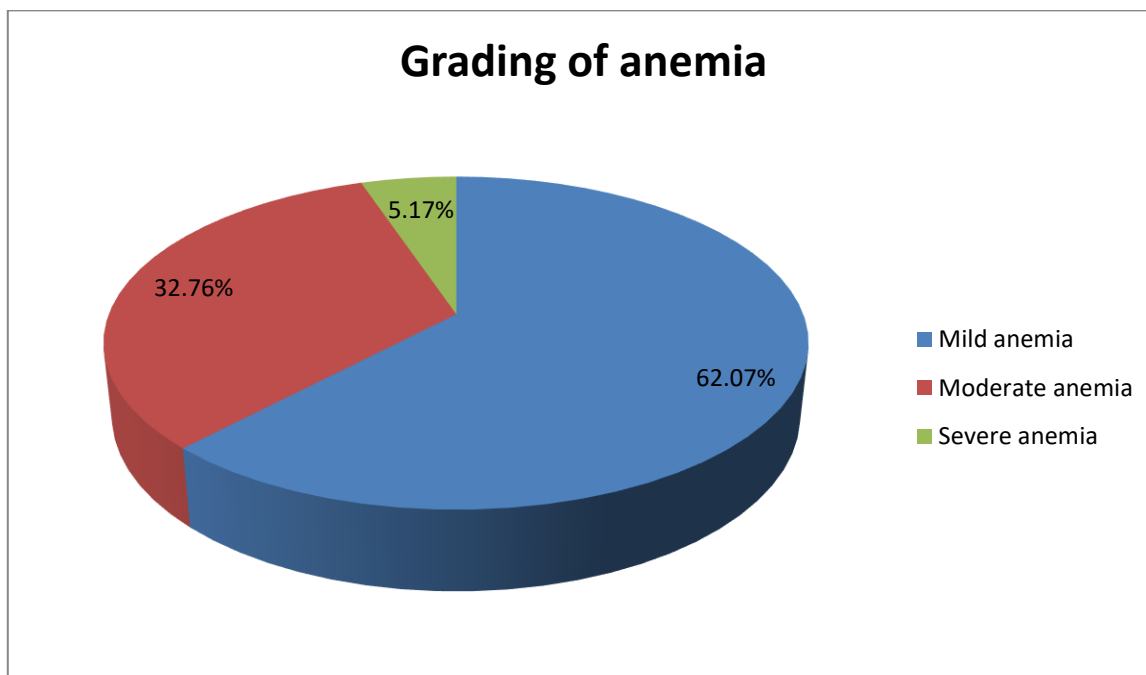


The grading of anemia among the given subjects are entered in Table 2 and Figure 3

Table 2: Grading of anemia in the study population

Grading of anemia	Males(n=180)	Females(n=134)	Total(n=314)
Mild	41(22.7%)	31(23.1%)	72(22.9%)
Moderate	18(10%)	20(14.9%)	38(12.1%)
Severe	2(1.1%)	4(2.9%)	6(1.9%)
Total	61(33.8%)	55(40.9%)	116(36.9%)

Figure 3: Grading of anemia in the study population



The RBC parameters of the anemic subjects are entered in Table 3.

Table 3: RBC parameters of the anemic population

Parameters	Mean	Standard Deviation
RBC count (x10 ⁶ /mm ³)	3.57	0.51
HCT(%)	29.9	3.69
MCV (µm ³)	84.4	8.1
MCH(pg)	28.3	3.3
MCHC (g/dl)	33.5	1.6

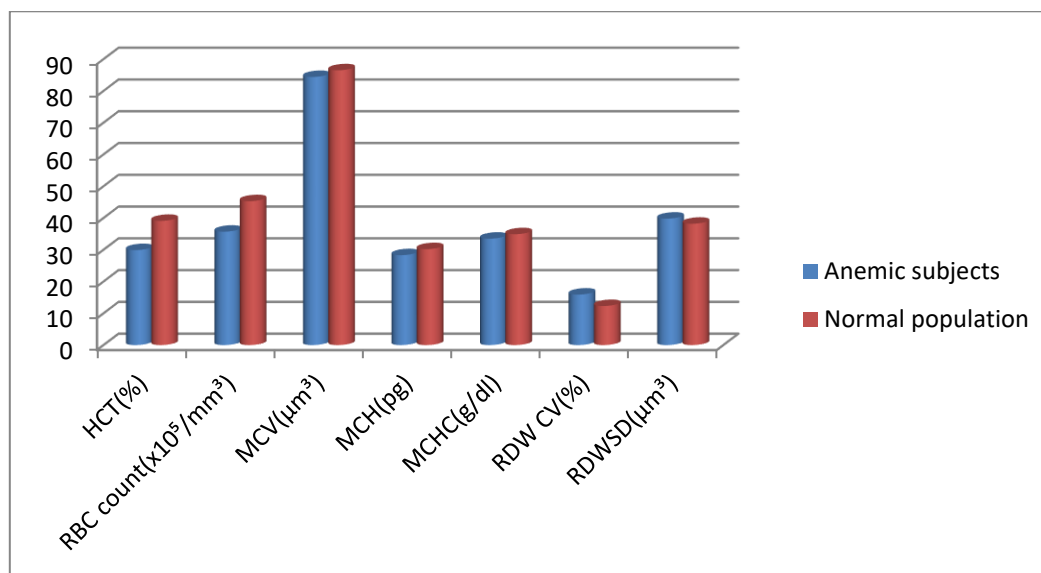
RDW CV(%)	15.9	1.66
RDW SD (μm^3)	39.8	4.0

Abbreviations: RBC:Red Blood Cell; HCT:Hematocrit; MCV:Mean Corpuscular Volume; MCH: Mean Corpuscular Hemoglobin; MCHC: Mean Corpuscular Hemoglobin Concentration; RDW-CV: Red cell Distribution Width-coefficient of variation ; RDW-SD:Red cell Distribution Width- Standard Deviation

Red Blood Cell (RBC) counts of the anemic subjects varied from $2.34 \times 10^6/\text{mm}^3$ to $4.58 \times 10^6/\text{mm}^3$ with a mean value of $3.57 \times 10^6/\text{mm}^3$. RBC counts of the normal population ranged from $3.65 \times 10^6/\text{mm}^3$ to $6.33 \times 10^6/\text{mm}^3$ with a mean value of $4.53 \times 10^6/\text{mm}^3$. Hematocrit (HCT) of the anemic subjects varied from 19.3% to 35.7% with a mean value of 29.9%. HCT of the normal population ranged from 31.5% to 47.3% with a mean value of 39.1%. Mean Corpuscular Volume (MCV) of the anemic subjects varied from $64 \mu\text{m}^3$ to $105 \mu\text{m}^3$ with a mean value of $84.4 \mu\text{m}^3$. MCV of the normal population ranged from $61 \mu\text{m}^3$ to $99 \mu\text{m}^3$ with a mean value of $86.5 \mu\text{m}^3$. Mean Corpuscular Hemoglobin (MCH) of the anemic subjects varied from 19.7pg to 38.1pg with a mean value of 28.3pg. MCH of the normal population ranged from 19.4pg to 34.3pg with a mean value of 30.2pg. Mean Corpuscular Hemoglobin Concentration (MCHC) of the anemic subjects varied from 29.5g/dl to 37.2g/dl with a mean value of 33.5g/dl. MCHC of the normal population ranged from 31.5g/dl to 46.6g/dl with a mean value of 34.9g/dl. Red cell Distribution Width-coefficient of variation (RDW-CV) of the anemic subjects varied from 10.6% to 17.7% with a mean value of 15.9%. RDW-CV of the normal population ranged from 10.5% to 16.5% with a mean value of 12.3%. Red cell Distribution Width-Standard Deviation (RDW-SD) of the anemic subjects varied from $33 \mu\text{m}^3$ to $51 \mu\text{m}^3$ with a mean value of $39.8 \mu\text{m}^3$. RDW-SD of the normal population ranged from $30 \mu\text{m}^3$ to $46 \mu\text{m}^3$ with a mean value of $38.2 \mu\text{m}^3$.

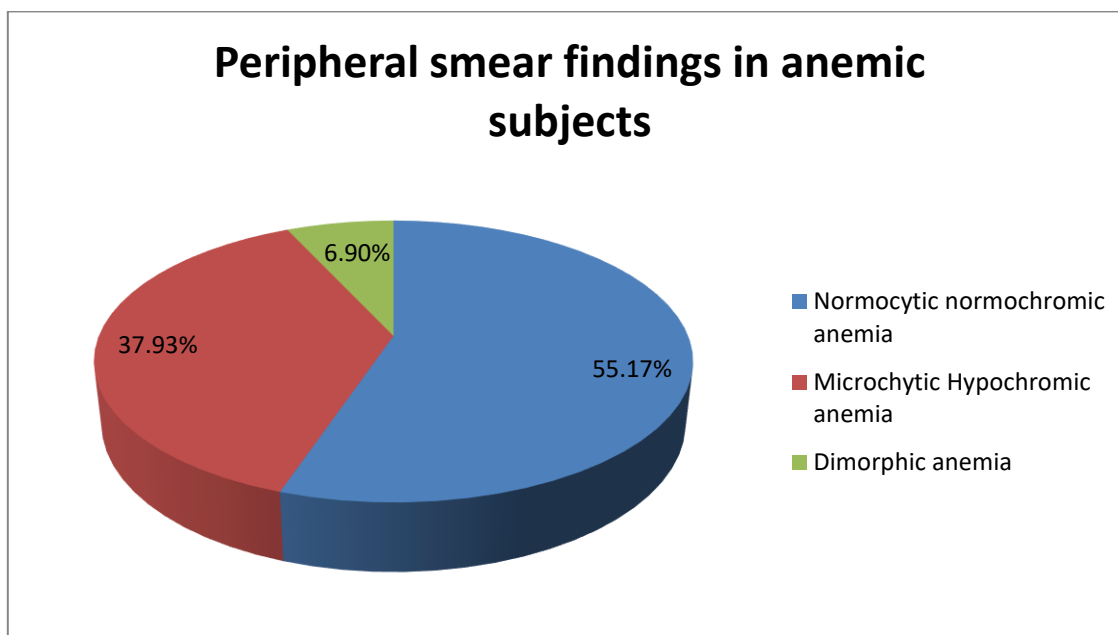
A comparison of the RBC parameters of the anemic and non-anemic population is depicted in Figure 4.

Figure 4: RBC parameters in the study population



Peripheral smears of all the anemic subjects were examined and 64 patients were reported as having Normocytic normochromic anemia while 44 patients were reported as Microcytic hypochromic anemia. 8 cases of dimorphic anemia were reported. The peripheral smear findings are illustrated in Figure 5.

Figure 5: Peripheral smear findings in anemic subjects



IV. DISCUSSION

The study conducted in an urban population showed that 36.9% of individuals above the age of 60 years were anemic. These individuals were otherwise healthy and had no other comorbidities. Out of these individuals, majority were males constituting for 57.4% of the anemic population. 55.17% of the anemic individuals were reported as having normocytic normochromic anemia while the rest were reported as microcytic hypochromic anemia and dimorphic anemia.

Previous studies have showed that prevalence of anemia in communities depends on the area being included in the study and the cut-off values for diagnosis of anemia. Previous studies have shown an incidence of anemia ranging from 10- 24% in geriatric population.

A study conducted in 2006 by Purty AJ et al in a rural area of Tamil Nadu showed that prevalence of anemia was 52.5% in their study population of old age people⁽¹⁰⁾, while a prevalence of 68.5% was seen in a study conducted by Srivastava et al⁽¹¹⁾ in 2013 in an urban geriatric population of Karnataka. Paul SS et al in 2015 conducted a study in a rural area of Tamil Nadu and showed the prevalence of anemia to be 38.2% among individuals older than 60 years.⁽¹²⁾

A study conducted by Sudarshan et al⁽¹³⁾ in 2016 in Pondicherry showed that prevalence of anemia was 96% in their geriatric study population. Renjini et al⁽¹⁴⁾ in 2019 showed a 76% prevalence of anemia in old age homes of Kerala, while in 2020, a study conducted in Kochi, Kerala by Retnakumar et al showed a prevalence of 60.6% in an urban population.⁽¹⁵⁾

A study conducted by Ashwini Aithal et al showed that that 36.1% of the geriatric study population in South India was anemic.⁽¹⁶⁾

3 studies conducted in Northern India showed prevalence of anemia to be 68.7%, 68.8% and 96% respectively.^(17,18,19)

Our study showed that 72 patients were mildly anemic (62.07%), 38 were moderately anemic (32.76%), and 6 were severely anemic (5.17%). According to WHO, anemia prevalence of more than 40% in a community is considered a problem.

A study conducted by Gerardo Alvarez-Uria et al in 2014 among rural populations of India observed an increased prevalence of anemia in old age with the highest proportion of normocytic normochromic anemia in older adults.⁽²⁰⁾ This shows that other causes may have attributed to the occurrence of anemia, although older studies have mentioned that nutritional anemias are the most common in old age.

Our study also showed that 55.17% of anemic cases were normocytic normochromic anemia.

This increased prevalence of normocytic normochromic anemia among anemic individuals warrants a need for investigating the cause for the same. The limitation of our study was that a causal relationship could not be assessed as it was a cross-sectional study.

Several studies have mentioned that an age-adjusted cut-off value should be used for evaluation of anemia in old age as the hemoglobin levels drop with age advancement.⁽²¹⁾

V. CONCLUSION

Our study shows a 36.9% prevalence of anemia among old age population with no coexisting comorbidities. Although many programmes have been initiated by the Government to ensure nutritional adequacies, the increasing occurrence of normocytic normochromic anemia need to be studied into and a revised cut-off for anemia has to be introduced for the geriatric population. Screening for anemia at a primary health care level needs to be continued and early detection and correction of anemia has to be done.

VI. CONFLICTS OF INTEREST:

None

VII. FUNDING :

None

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