Evaluation of anaemia in geriatric patients: a retrospective hospital-based study from Northern Sri Lanka

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Abstract

Background: Anaemia in older adults is a common medical problem but it is often not evaluated as a sole clinical entity and its importance is undermined. The gravity of anaemia in older adults and its impact on other diseases is not well known in Sri Lanka.

Methods: This was a cross-sectional descriptive study where data was extracted retrospectively from the database and clinical records of patients who were referred to the haematology unit of Teaching Hospital Jaffna, Sri Lanka for the evaluation of anaemia, from September 2020 to February 2021. The common types of anaemia, their severity, aetiological classifications and association with other diseases were analysed.

Results: A total of 1121 medical records of patients above 60 years were analysed during the study period. The main source of referrals was from medical wards. The female to male ratio was 51.2:48.8.The majority belonged to the age group of 60-69 years. Two-third of the patients had normocytic anaemia (70.3%) followed by microcytic (23.7%) and macrocytic anaemia (6.0%). A moderate degree of anaemia was seen commonly, but 28.3% were found to have severe anaemia. Aetiological classification revealed anaemia of chronic disease as the commonest type of anaemia in older adults accounting for 37% of the study sample, followed by multifactorial aetiology and iron deficiency anaemia. Common chronic diseases identified along with anaemia were diabetes, hypertension, ischaemic heart disease and chronic kidney disease.

Conclusions: Normocytic anaemia was the commonest type identified and the majority were of a moderate degree. Though the commonest aetiological cause identified is anaemia of chronic disease, there was a considerable percentage of multifactorial causes indicating the need to be on the lookout for other possibilities. Identifying the prevalence of anaemia in all hospitalised older adult patients in the local setting, the causes and the impact on chronic and acute illnesses will immensely help in the management of older adult patients and improve their quality of life.

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Key words: Anaemia, older adults, anaemia of chronic disease, normocytic normochromic anaemia

Introduction

Anaemia in older adults, being one of the commonest medical problems in clinical practice, often goes unnoticed unless it is severe or causes deterioration of the underlying medical condition (1). Older adults have many age-related physiological changes which make the clinical presentation of anaemia atypical and unnoticeable (2). The onset of anaemia is often insidious and patients tend to adapt to the clinical deterioration (3, 4).

Prevalence of anaemia in older adults is higher in developing countries ranging between 20.6%-49.5% (5). However, its exact prevalence in hospitals and the community is not known. A huge burden of anaemia in older adults is seen in many developing countries with a very high prevalence in Africa and South-East Asia (6). Sri Lanka, being a South Asian country is not an exception to this, however it lacks the exact data on anaemia in older adults.

Good health standards have led to a rise in the older adult population surviving with many comorbidities. Thus anaemia, being common with many chronic illnesses increases exponentially causing significant morbidity and mortality (1). Anaemia in hospitalised elderly patients is a critical clinical problem and often multifactorial (4, 7). Often anaemia in hospitalised patients is complicated by acute illnesses and will not truly reflect the anaemia prevalence in the community. There are no major studies done on anaemia in hospitalised patients in Sri Lanka except a published abstract that reported 41.3% of anaemia among 230 older adults patients who attended the teaching hospital Peradeniya and chronic inflammation was reported as the main aetiological cause (8).Anaemia in older adults has many underlying aetiologies of which the common causes are chronic disease or chronic inflammation and nutritional deficiency. Many patients may have more than one aetiology while in some it is unexplained (9). Any degree of anaemia, whether mild or severe, contributes to hospitalization, morbidity, mortality and negative impact on quality of life and it was shown that even a mild degree of anaemia can compromise patient-well-being and survival regardless of the cause and need for evaluation(2, 6,10-18). Mortality is higher among anaemic patients with IHD, heart failure, and chronic kidney disease (19, 20).

Anaemia can be easily diagnosed and reversed. Identifying the type of anaemia, aetiology and associated comorbidities will help in the management of older adults with significant improvement in quality of life, morbidity and mortality. The treatment of anaemia starts with the correct diagnosis of the underlying condition (1). Though anaemia in older adults is very common in clinical practice, there was no research carried out to identify the types, aetiology, and common comorbidities in the local setting. Hence this retrospective study was initiated to understand the anaemia in older adults, its types and associated comorbidities. Our main objective was to identify the common types of anaemia in hospitalised older adults.

Methods

This was a cross-sectional descriptive study and data were extracted retrospectively from the database and clinical records of patients who were referred to the Haematology Unit of Teaching Hospital Jaffna for evaluation of anaemia during the study period.

The study included all the patients above 60 years of age who underwent haematological evaluation for anaemia over a period of 6 months (1st September 2020 to 28th February 2021).

Proportions from a study conducted in India was referenced for the calculation of sample size (21, 22). The minimum sample size was determined to be 403. We were able to collect data from 1121 medical records of patients who fulfilled the inclusion criteria.

Data were collected using data extraction sheets by a trained medical officer.

For the diagnosis of anaemia WHO classification was used. Haemoglobin of <13 g/dL in men and <12 g/dL in women were identified as anaemic. It was further classified into mild, moderate and severe based on blood haemoglobin levels (6).

The diagnosis of different types of anaemia was done based on the standard criteria (7, 9, 21, 23) and is concluded by the Consultant Haematologists (24). Anaemia of multifactorial aetiology was diagnosed when they fulfilled more than one aetiology.

Data analysis: Data were analysed using a recommended statistical package (SPSS version 28.0). Quantitative variables were expressed as percentages with CI while mean values were calculated with SD for numeric variables. The chi-squared test was used to identify associations where a p value <.05 was considered statistically significant.

Results

Out of 1121 records analysed, most of the patients were referred from medical wards (79.1%). A further 7.9% were referred from surgical wards. The remaining 13% were referred from other wards such as gynaecology, orthopaedic, cardiac, etc. Background characteristics of patients are summarized in Table 1.

Table 1 - Background Characteristics of older adults with anaemia (n=1121)

Variable	Categories	No	Percentage (%)
Age (years)	60-69	491	43.8
	70-79	473	42.2
	≥ 80	157	14.0
Sex	Male	547	48.8
	Female	574	51.2
Marital Status	Married	1081	96.4
	Single	20	1.8
	Widowed	20	1.8
Smoking Status	Yes	202	18.0
	No	919	82.0
Alcohol consumption	Yes	225	20.1
	No	896	79.9
Being vegetarian	Yes	238	21.8
	No	883	78.8

The mean age of patients was 71.3 years (range: 61 to 99). The majority were aged 60-69 years (43.8%) closely followed by the 70-79 year group (42.2%). Female participants were slightly higher (51.2%) compared to males (48.8%). Further 21.8% were vegetarian. Mean (SD) Hb of the 1121 patients was 8.88±1.95 with a minimum of 2 to a maximum of 12.9 g/dL.

Table 2 - Distribution of study subjects according to their age, sex and the comorbidities

Age group (years)	Male n (%)	Female n (%)	Total n (%)
60-69	232(42.4)	259(45.1)	491 (43.8)
70-79	222 (40.5)	251(43.7)	473 (42.2)
80 and above	93(17.1)	64(11.2)	157 (14.0)
Total	547 (100)	574(100.0)	1121 (100.)
Comorbidities			
Diabetes Mellitus	233 (42.6)	263 (45.8)	496 (44.2)
Hypertension	256 (46.8)	290 (50.5)	546 (48.7)
Cerebrovascular Accident	41 (7.5)	27 (4.7)	68 (6.1)
Bronchial Asthma	49 (9.0)	56 (9.8)	105 (9.4)
Chronic obstructive pulmonary disease	34 (6.2)	6 (1.0)	40 (3.6)
Rheumatoid Arthritis	6 (1.1)	28 (4.9)	34 (3.0)
Peptic Ulcer Disease	11 (2.0)	18 (3.1)	29 (2.6)
Chronic kidney disease	71 (13.0)	57 (9.9)	128 (11.4)
Hypothyroidism	17 (3.1)	52 (9.1)	69 (6.2)
Malignancies	17 (3.1)	20 (3.5)	37 (3.3)
Dyslipidaemia	34 (6.2)	59 (10.3)	72 (6.5)
Epilepsy	10 (1.8)	7 (1.2)	17 (1.5)
Psychiatric illness	6 (1.1)	7 (1.2)	13 (1.2)
Tuberculosis	12 (2.2)	5 (0.95)	17 (1.5)
Chronic liver cell disease	13 (2.3)	9 (1.6)	22 (2.0)
Dementia	1 (0.2)	1 (0.2)	2 (0.2)

Comorbidities among participants:

The commonest comorbidities observed among older adult patients with anaemia were hypertension (48.7%) and diabetes mellitus (44.2%). Among the patients with CKD, five were in stage 3a (0.4%), another 29 of them (2.6%) in stage 3b, further 47(4.2%) in stage 4 and 42 were in stage 5.

Majority (56.6%) had moderate anaemia (Hb=8.0-10.9 g/dL) while 28.3% were of the severe category (Hb<8g/dL). About 15.1% accounted for mild anaemia (Hb=11.00-11.9 g/dL).

Bleeding History and blood transfusion:

Of 1121 patients, 10% had a bleeding history while 16.6% had reported blood transfusion. Of the study population, 9.5% had had a blood transfusion within the past three months. Among the patients with a bleeding history, 35.7% have had a blood transfusion while among those without a bleeding history only 14.5% have had a blood transfusion.

This study also examined the common medications linked to anaemia and the results are summarized in Table 3.

Patterns (Types), severity and aetiology of anaemia:

Majority of the participants (70.3%) had normocytic anaemia followed by microcytic (23.7%) and macrocytic anaemia (6.0%) respectively. Aetiological causes of anaemia are summarised in Table 4. The commonest aetiology was anaemia of chronic disease (ACD) (37.0%).

Iron deficiency anaemia (IDA):

There was no significant difference in gender observed among those with IDA. Similarly, no significant difference was observed between vegetarians and non-vegetarians. Among the 101 who had iron deficiency as a sole aetiological cause, 14.9% had a bleeding history while among 1020 patients who had other forms of anaemia only 9.5% had a bleeding history.

Table 3 - Common relevant medication usage among older adults with anaemia

Medication	Number	Percentage (%)
Aspirin	285	25.4
Clopidogrel	174	15.5
NSAIDs	16	1.4
Iron Tablets	64	5.7
Vitamin B12	17	1.5
Folate	62	5.5
Metformin	213	19.0
PPI (Proton pump inhibitor)	136	12.1
Methotrexate	11	1.0
Anti-epileptics	19	1.7

Table 4 - Types of anaemia based on Mean Corpuscular Volume & aetiology

Type of anaemia	Number	Percentage % (95% CI)
MCV<80 (microcytic)	266	23.7 (21.3-26.3)
MCV-80-100 (normocytic)	788	70.3 (67.6-72.9)
MCV>100 (macrocytic)	67	6.0 (4.7-7.7)
Diagnosis (aetiological classification)		
Anaemia of chronic disorders (ACD)	415	37.0 (34.2-39.9)
Multifactorial	169	15.1 (13.1-17.3)
Iron Deficiency Anaemia (IDA)	101	9.0 (7.4-10.8)
Anaemia of Renal disease	92	8.2 (6.7-9.9)
Mixed deficiency anaemia	80	7.1 (5.7-8.8)
B12/folate deficiency	74	6.6 (5.3-8.2)
Haematological malignancy	36	3.2 (2.3-4.4)
Non-immune haemolytic anaemia	33	2.9 (2.1-4.1)
Anaemia of acute illness	31	2.8 (1.9-3.9)
Anaemia of acute blood loss	31	2.8 (1.9-3.9)
Anaemia associated with Hypothyroidism	7	0.6 (0.3-1.3)
Autoimmune haemolytic anaemia	5	0.4 (0.2-1.0)
Others (diagnosis not confirmed)	7	0.6 (0.3-1.3)

Anaemia due to B12/folate deficiency:

Of those with B12/folate deficiency 50% had macrocytic anaemia while another 50% was normocytic. Among 74 patients who had B12 deficiency anaemia, 48.6 % were vegetarian while among 1047 patients who did not have B12 deficiency, only 19.3 % were vegetarian (p<.05). Among the patients with B12 deficiency, 54.1% were males and 45.9% were females (p=.349).

Anaemia of Chronic Disease:

The commonest aetiological cause in the study population (Table 5) was ACD (37.0%). Diabetes mellitus (55.2%) and Ischaemic Heart Disease (21.9%) were the commonest chronic diseases among them. Majority were normocytic (86.3%), followed by the microcytic (12.5%) and macrocytic (1.2%) respectively.

Anaemia with Multifactorial aetiology

Sub-analysis of anaemia due to multifactorial aetiologies shown in Table 6.

Table 5 - Distribution of chronic diseases among patients with anaemia of chronic disease

Disease	Number	Percentage %
Diabetes Mellitus	194	55.2
IHD	77	21.9
RA(Rheumatoid arthritis)	19	5.41
Non haematological malignancies	17	4.84
COPD	12	3.43
Chronic wound	8	2.28
Bronchiectasis	8	2.28
Tuberculosis	6	1.71
HIV	3	0.86
HTN	1	0.28
Others(including missing)	70	19.94

Table 6 - Distribution of patients as per underlying causes in anaemia with multifactorial aetiology *patients (n-169).

Cause	Number	Percentage %
ACD + Acute blood loss	10	5.9
ACD+B12 Deficiency	5	3.0
ACD+IDA	59	34.9
ACD+ Acute illness	18	10.6
ACD+ Mixed deficiency	11	6.5
ACD+ Renal failure	29	17.1
IDA+ Acute Blood Loss	6	3.6
Liver Disease +Acute Blood loss	1	0.6
Others	30	17.8

Discussion

A study done in North India found that the mean age of patients with anaemia was 68.1±7.8 years, male to female ratio was 1.6:1 and mean value of Hb was 8.8± 2.3 g/dL,(21). Many other studies also found that men have a higher prevalence of anaemia than women in older adults (25). In comparison, our study population revealed a mean age of 71.3 years with a slight female predominance. The majority was in the 60-69 years and 70-79 years age group with female predominance. However, males were more in the age group >80 years.

The commonest type of anaemia based on mean corpuscular volume in our study was normocytic anaemia (70.3%) followed by microcytic anaemia (23.7%) and macrocytic anaemia (6.0%). This was in keeping with a study done in Ethiopia where normocytic anaemia was identified as the commonest cause of anaemia in hospitalised older adult patients (2, 26).

Majority had a moderate severity(56.6%), followed by severe anaemia (28.8%) in our study. A hospital-based study done in Tanzania revealed that more than two-third of the participants were having either moderate or severe anaemia (27). However, there were contrasting results in other studies where mild anaemia was mainly identified in the older adult population (2, 5). Studies done in the community and elder homes revealed mild anaemia as the commonest type of anaemia (28-32). As our study included the patients who were referred for haematological evaluation, there is a high possibility that mild cases of anaemia may have been evaluated in general wards without being referred to haematology. The common medication usages among older adult patients with anaemia were aspirin, metformin, clopidogrel and PPI in our study. However, the high percentage of non-communicable diseases notably DM, hypertension and IHD in the study population justify these medication usages. Our analysis revealed among patients using aspirin, only 6.7% reported bleeding while bleeding history was noted in 11.1% of non-aspirin users. It is likely

that the patients on aspirin were on regular medical clinic follow up for underlying diseases where anaemia had been detected and treated. This finding is in line with a previous study where they found anaemia was 42% less common among aspirin users (33). But in contrast, a clinical trial conducted among older adults from Australia and US reported the use of low-dose aspirin for primary prevention resulted in a significantly higher risk of major haemorrhage (34). Whether aspirin use has a causal relationship with anaemia in older adults needs a thorough evaluation.

As in other studies, anaemia of chronic disease (37%) was the most common type identified in the hospitalised older adult patients followed by anaemia due to multifactorial causes and IDA(35,36).The common aetiologies identified in the multifactorial causes were IDA, CKD, acute illnesses, etc. IDA is the 3rd common cause of anaemia and the second most common single cause in the study population. Presence of multifactorial aetiology indicates the need to identify additional factors in the evaluation of anaemia in older adults. Table 7 shows a comparison of common aetiological causes of anemia among developing and developed countries with the current study. Here it was observed that our study had more patients with anaemia of chronic disease and multifactorial causes in comparison to developing countries.

Conclusion

Normocytic anaemia was identified as the common type of anaemia in hospitalised older adults and the common aetiological cause identified was anaemia of chronic disease followed by multifactorial causes and IDA. The majority were of a moderate degree and there was a considerable percentage of multifactorial causes indicating the need to be on the lookout for other possibilities.

Limitations

This study involved only the patients referred to

Table 7 - Comparison of common aetiological causes studies from developing countries and developed countries with the current study

Diagnosis	Current study % (CI)	In Developing countries % (CI) ref:(21, 36)	In Developed countries % (CI)ref: (35-38)
Anaemia of chronic disorders (ACD)	37.0 (34.2-39.9)	22.9 (15.6-31.6)	36.5 (32.1-41.2)
Multifactorial	15.1(13.1-17.)	7.6 (3.6-14.0)	28.1 (24.0-32.4)
Iron deficiency anaemia (IDA)	9.0 (7.4-10.8)	24.8 (17.2-33.8)	4.6 (2.5-7.9)
Anaemia of renal disease	8.2 (6.7-9.9)	12.4 (7.1-19.8)	19.4 (14.7-24.8)
Mixed deficiency anaemia	7.1 (5.7-8.8)	-	2.0 (1.0-3.8)
B12 deficiency	6.6 (5.3-8.2)	2.8 (0.7-7.6)	5.9 (3.4-9.5)
Haematological malignancy	3.2 (2.3-4.4)	20 (13.2-28.5)	7.5 (4.2-12.1)
Nonimmune haemolytic anaemia	2.9 (2.1-4.1)	-	-
Anaemia of acute illness	2.8 (1.9-3.9)	-	-
Anaemia of acute blood loss	2.8 (1.9-3.9)	2.17 (0.1-9.5)	-
Anaemia associated with Hypothyroidism	0.6 (0.3-1.3)	-	6.6 (4.3-9.8)
Others (unexplained)	0.6 (0.3-1.3)	8.6 (4.3-15.1)	43.7 (36.4-51.1)
Autoimmune haemolytic anaemia	0.4 (0.2-1.0)	-	-

the haematology department for further assessment of anaemia during the study period. Patients who have not been referred, especially cases of mild anaemia have therefore been missed in the study. Hence it does not reflect the true prevalence of anaemia in hospitalised patients. Further due to the retrospective design this study is impacted by the limitations/deficiencies in documentation. This study depended on investigations available in the government sector for diagnosis and therefore was limited by it. e.g., B12 level was not assessed to diagnose B12 deficiency because it was unavailable. Diagnosis of different types of anaemia on such occasions were made based on consensus reached by local haematologists.

Recommendations: A large prospective hospital-based study, as well as a community-based study, is needed in Sri Lanka as the prevalence and aetiology of anaemia in both settings differ and need a different approach to evaluation and management. Further adopting a systematic evaluation protocol in anaemia to identify the underlying cause of anaemia in older adults is of paramount importance as it will guide the treatment, improve the outcome and help to improve quality of life.

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