ANAEMIA IN ELDERLY PATIENTS AT
KENYATTA NATIONAL HOSPITAL

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A dissertation submitted in part-fulfilment for the degree of Master of Medicine (Medicine) of the University of Nairobi.

1988
This dissertation is my original work and has not been presented for a degree to any other University.

PHILIP LIKONDO SIMANI M.B. CH.B.
CANDIDATE

This dissertation has been submitted for examination with our approval.

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To my Mother and Father
I would like to express my sincere appreciation:

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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (TITLE)</td>
<td>(i)</td>
</tr>
<tr>
<td>II (DECLARATION)</td>
<td>(ii)</td>
</tr>
<tr>
<td>III (DEDICATION)</td>
<td>(iii)</td>
</tr>
<tr>
<td>IV (ACKNOWLEDGEMENTS)</td>
<td>(iv)</td>
</tr>
<tr>
<td>V (TABLE OF CONTENTS)</td>
<td>(vi)</td>
</tr>
<tr>
<td>VI (LIST OF TABLES)</td>
<td>(vii)</td>
</tr>
<tr>
<td>VII (LIST OF FIGURES)</td>
<td>(viii)</td>
</tr>
<tr>
<td>VIII (ABSTRACT)</td>
<td>(x)</td>
</tr>
<tr>
<td>IX (INTRODUCTION)</td>
<td>1</td>
</tr>
<tr>
<td>X (OBJECTIVES)</td>
<td>5</td>
</tr>
<tr>
<td>XI (MATERIALS AND METHODS)</td>
<td>6</td>
</tr>
<tr>
<td>XII (RESULTS)</td>
<td>12</td>
</tr>
<tr>
<td>XIII (DISCUSSION)</td>
<td>44</td>
</tr>
<tr>
<td>XIV (CONCLUSIONS)</td>
<td>52</td>
</tr>
<tr>
<td>XV (RECOMMENDATIONS)</td>
<td>53</td>
</tr>
<tr>
<td>XVI (REFERENCES)</td>
<td>55</td>
</tr>
<tr>
<td>XVII (APPENDIX)</td>
<td>61</td>
</tr>
</tbody>
</table>
## LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLES</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sex distribution in relation to age and haemoglobin level</td>
<td>13</td>
</tr>
<tr>
<td>2</td>
<td>Ethnic origin of the patients</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Frequency of symptoms at presentation</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>Major clinical findings on general examination</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>Haematological parameters</td>
<td>24</td>
</tr>
<tr>
<td>6</td>
<td>Distribution of patterns on peripheral blood film</td>
<td>25</td>
</tr>
<tr>
<td>7</td>
<td>Frequency of features on bone marrow aspirate</td>
<td>27</td>
</tr>
<tr>
<td>8</td>
<td>Frequency distribution of gastrointerstinal malignancies</td>
<td>41</td>
</tr>
<tr>
<td>9</td>
<td>Frequency distribution of tumours affecting the genitourinary and haematological systems</td>
<td>42</td>
</tr>
<tr>
<td>10</td>
<td>Table of treatment modalities patients were commenced on</td>
<td>43</td>
</tr>
</tbody>
</table>
### LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Histogram showing age distribution of the patients</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>Patient with low haemoglobin (Hb&lt;5g/dl) presenting with severe pallor as indicated by the tongue</td>
<td>19</td>
</tr>
<tr>
<td>3</td>
<td>Patient with marked wasting and anaemia. Note wasting of biceps muscles and inability of patient to support himself due to weakness</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Tongue in anaemic patient with raw surface and papillary atrophy</td>
<td>21</td>
</tr>
<tr>
<td>5</td>
<td>Koilonychia in finger nails of elderly patient with iron-deficiency anaemia</td>
<td>22</td>
</tr>
<tr>
<td>6</td>
<td>Normal bone marrow cytology</td>
<td>28</td>
</tr>
<tr>
<td>7</td>
<td>Graph of Serum folate levels</td>
<td>29</td>
</tr>
<tr>
<td>8</td>
<td>Graph of serum vitamin B&lt;sub&gt;12&lt;/sub&gt; levels</td>
<td>30</td>
</tr>
<tr>
<td>9</td>
<td>Graph of Red cell Folate levels</td>
<td>31</td>
</tr>
<tr>
<td>10</td>
<td>Hypochromic microcytic anaemia in a patient with iron deficiency</td>
<td>32</td>
</tr>
<tr>
<td>11</td>
<td>Hypersegmented neutrophil in megaloblastic anaemia</td>
<td>33</td>
</tr>
<tr>
<td>12</td>
<td>Oval macrocytes in peripheral film of patient with megaloblastic anaemia</td>
<td>34</td>
</tr>
<tr>
<td>13</td>
<td>Micronormoblast in iron deficiency anaemia in bone marrow</td>
<td>35</td>
</tr>
</tbody>
</table>
Irregular cytoplasmic margin, irregular nuclei some pyknotic changes features of dyserythropoiesis in a patient with megaloblastic anaemia

Daily dietary ratio of foods eaten by patients

Frequency distribution of associated systemic disease
The main objective of this work was to study anaemia in elderly patients and hence contribute some baseline data for future possible work in this area.

This prospective study covered 63 elderly patients of all types of anaemia diagnosed at Kenyatta National Hospital between September 1987 and January 1988. Those cases admitted to this hospital were further fully investigated and treated if they did not die immediately. Then several clinicopathological variables and biodata were analysed in all the cases.

Anaemia was found to occur in about 11% of elderly patients admitted and reviewed. The single most common cause was iron deficiency, (34.9%) while the majority of patients had anaemia which was multifactorial in origin, with hookworm, systemic disease and diet playing contributory roles.
Gastrointestinal diseases played an important role while other systemic illnesses were not prominent.

Effective management is beset with problems of diagnosis, availability of blood and often drugs.

This study shows that anaemia is common in elderly patients admitted to Kenyatta National Hospital and contributes significantly to their morbidity. There is an urgent need to do further work into the contributions of different factors such as hookworm and diet to anaemia in geriatric patients, if ideal management specifically directed towards this age group is to be achieved.
Anaemia has for long been known to be a common problem within the tropics. In a scientific paper read to the Berlin Medical Society on May 31st 1899, Plehn (1) acknowledged that it was "a well known fact to medical practitioners residing in unhealthy districts in the tropics that a number of patients ... suffered from poverty of blood". Anaemia occurring in the tropics was no isolated phenomenon but similar to that found universally (1,2).

Plum working amongst the Digo and Embu found a higher degree of anaemia associated with Ancylostomiasis (3). In these cases iron therapy always resulted in some improvement, but the causes were not always clear. At about the same time Chevallier et al. wrote that anaemia was a common problem amongst the African population (4). Brock realised that this was strongly influenced by parasites and these had to be excluded in determining the aetiology (5).
Despite knowledge of the occurrence of anaemia, proper studies were not performed for a long time to determine prevalence in local populations (6,7). Amongst the few early studies done locally Trowell's work in Uganda established that not only was anaemia common but it was also a major cause of morbidity and mortality and was multifactorial in nature (8). He underlined the need for further work in this area. Foy and Kondi undertook extensive research into this problem and they singled out iron deficiency anaemia as being the most prevalent in the tropics (9). They also wrote that it was widespread, severe and an important cause of morbidity. Geographical patterns also emerged from their study and iron deficiency was found to be more prevalent in coastal areas than in the highlands were the megaloblastic types featured prominently. From their experience most patients presented with severe anaemia. Sexual and seasonal patterns were also noted with megaloblastic anaemias being more frequent in males and occurring with a seasonal distribution.

Manson-Bahr studied anaemia in Nairobi and found most cases to be of iron-deficiency type followed by haemolytic anaemia and megaloblastic anaemia (10). Latha and other workers stressed the importance of
nutrition in the causation of anaemia in the tropics (11-13), while others emphasized the role of hookworm (14-18). The subject of malaria as an aetiologica
factor in anaemia especially in children has been extensively studied throughout the tropics (19-27).
The early studies suggested a low incidence of multiple factors; sickle-cell disease was the most common
haemoglobinopathy while Ancylostoma duodenale was the most common single aetiologica
factor (28).
Pernicious anaemia was found to be uncommon; Mngola for instance reported only two cases (29). Anaemia was
also found to be common in pregnancy as shown by Mati, Habany and Gabbie (30) and Mwana Kuzi and Nhonoli (31).

The paucity of literature on anaemia in elderly patients within the tropics is surprising. While in recent years studies have been done in temperate
countries (32), the subject has yet to be fully investigated within the tropics.

The hypothesis put forward is that anaemia encountered in the elderly in tropical regions such as Kenya is predominantly multifactorial in nature.
Definitions

The following definitions were made as relates to the study:

1. Anaemia is defined as a decrease in circulating haemoglobin per unit volume of blood below the level found within a specific community with respect to age, sex, and altitude (33). A value of 12.0 gdl⁻¹ was chosen (34).

2. Elderly was defined as an age of 60 years and over.

Rationale

The reason for the study was to contribute some data on anaemia in elderly patients as it is a major cause of morbidity within the community (27).
The broad objective of the study is :-

a) To study anaemia in elderly patients at Kenyatta National Hospital.

Specific Objectives are the following;

a) To conduct a prospective study at Kenyatta National Hospital in order to determine the incidence of anaemia in the elderly patient population.

b) To determine the frequency distribution of the different types of anaemia and the causes where possible.

c) To suggest rational approaches to the treatment of anaemia in this age group.
MATERIALS AND METHODS

Study Area

The study was conducted at Kenyatta National Hospital amongst patients in the surgical, medical and oncology wards. The period of study was from 1st September 1987 to 30th January 1988. This period was selected to coincide with optimum availability of materials for the study.

Ethical Considerations

Permission was sought and granted from the Kenyatta National Hospital Ethical Committee in order to undertake this study. Informed consent was obtained from the patients who participated in the study.

Study Patients

All consecutive in-patients aged 60 years and above who were found to be anaemic (Hb < 12.0 g/dl) were included in the study.
Selection of the patients was on the basis of clinical impression of anaemia such as pallor and laboratory indices. The study included both patients with anaemia as a major problem and those having other problems but associated with anaemia.

**Exclusion Criteria**

The following were criteria used to exclude patients from the study:

i) Patients on cytotoxic therapy

ii) Patients on haematogenic therapy (iron or folate or vitamin B₁₂).

iii) Patients who had been transfused in the previous three months.

iv) Acute surgical emergencies

v) Post-operative cases following major surgery requiring deep anaesthesia.

Fourteen healthy elderly adults were randomly selected as controls.

**Data Collection**

Age of the patient was determined on the basis of history and identity card examination. For each patient name, age, sex, in-patient number and home of
origin were noted. Past medical history and physical findings relevant to the diagnosis were coded on proforma I shown in the appendix.

**Laboratory Methods**

Ten millilitres of blood were drawn via a peripheral vein under aseptic conditions. Two millilitres were put in a sequestrine bottle and this sample was used to make a peripheral smear and in addition to estimating the following:

i) Haemoglobin (Hb).

ii) Packed Cell Volume (PCV).

iii) Mean corpuscular volume (MCV).

iv) Total red blood cell count.

These parameters were obtained using the Coulter Counter (Model S).

Peripheral blood films were stained using standard May-Grunwald Giemsa stain. Stained blood slides were examined and interpreted by the staff in the haematology section of the department of pathology.

Five millilitres were heparinized and the plasma and red cells separated at 3,000 revolutions per minute, for 5-10 minutes and both samples stored at -20 °Celsius.
A bone marrow aspirate using Klima or Salah needles was performed on all patients. The smears made were immediately processed and stained with May Grunwald Giemsa stain and optionally stained with cosin for iron stores. Stained slides were interpreted under a light microscope in the haematology section of the department of pathology.

Stool and urine samples were routinely screened for parasites and blood.

Specialized procedures

Stored serum and red cell samples stored at \(-20^\circ\) Celcius were used to assay serum and red cell folate and serum vitamin B12 levels, using a dual radioimmune-assay Kit (Amersham).

A coombs test, liver function test, a haemolytic screen were done in those patients found to have a haemolytic anaemia.

Where possible further diagnostic tests as outlined in the appendix, proforma III, were done in order to delineate the cause of the anaemia.

All specimens were handled and taken to the laboratory by the author.
Dietary Ratios

A detailed dietary history was taken and based on 24-hour recall of the various foods eaten by the patients.

Results were tabulated as shown in proforma II of the appendix.

Total scores were calculated for each foodstuff and cumulated dietary ratio for all patients for the various food stuffs computed and presented as a ratio of the daily diet.

Control Population

Fourteen healthy, elderly adults with no history of recent medical illness and on normal balanced diet from dietary recall were equally (simultaneously) tested as above for Serum Vitamin B₁₂, serum folate and red cell folate levels.

These formed the control group.
The incidence was computed from results of the study and hospital admission records. Frequency tables were drawn demonstrating the clinical findings. Serum folate and vitamin B₁₂ and red cell folate data were graphically demonstrated and Fischers Exact Test performed to test the significance against the controls.

Routine haematological indices outlined above were tabulated and frequency, average and standard deviation calculated.
RESULTS

Of 664 patients admitted aged 60 years and above during the period of study, 75 (11.3%) had anaemia and were recruited into the study. Of this group 63 patients were interviewed and fully investigated. Complete profiles could not be obtained in 3 patients as no consent was given. An additional 4 patients could not be studied as they were inadvertently discharged early. Loss of samples and incomplete haematological data excluded 5 patients.

Age Distribution

Table 1 demonstrates wider age range (60-90) in females as compared to males (60-76) with a mean of 64.6 and 63.2 respectively. The male:Female ratio was 2:1. Figure 1 outlines the age distribution of the patients studied. The majority (57%) fell within the 60-64) year age group and the least patients were observed in the older age groups.

Geographical Distribution

Geographical origin of the patients is outlined in Table 2.
### Table 1

Sex distribution in relation to age and haemoglobin level.

<table>
<thead>
<tr>
<th>Sex</th>
<th>n</th>
<th>%</th>
<th>Age in years</th>
<th>Haemoglobin g/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Range</td>
<td>Mean</td>
</tr>
<tr>
<td>Male</td>
<td>42</td>
<td>66.6</td>
<td>60-76</td>
<td>63.2</td>
</tr>
<tr>
<td>Female</td>
<td>21</td>
<td>33.3</td>
<td>60-90</td>
<td>64.6</td>
</tr>
</tbody>
</table>
Fig. 1 Histogram showing age distribution of the patients under study.

% of Patients

```
<table>
<thead>
<tr>
<th>Age</th>
<th>% of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-64</td>
<td>57%</td>
</tr>
<tr>
<td>65-70</td>
<td>37.7%</td>
</tr>
<tr>
<td>71-74</td>
<td>1.6%</td>
</tr>
<tr>
<td>75-80</td>
<td>3.1%</td>
</tr>
<tr>
<td>81-84</td>
<td>0</td>
</tr>
<tr>
<td>85-90</td>
<td>1.6%</td>
</tr>
</tbody>
</table>
```
### TABLE 2

**Home of ethnic origin of the patients**

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>43</td>
<td>68.3</td>
</tr>
<tr>
<td>Nyanza</td>
<td>9</td>
<td>14.2</td>
</tr>
<tr>
<td>Eastern</td>
<td>4</td>
<td>6.3</td>
</tr>
<tr>
<td>Rift Valley</td>
<td>3</td>
<td>4.76</td>
</tr>
<tr>
<td>Coast</td>
<td>1</td>
<td>1.58</td>
</tr>
<tr>
<td>Others</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
The majority of patients 43 (68.3%) originated within Central Province. Nyanza Province followed with a contribution of 9 patients and the least were from Coast province (1 patient) 1.58%. These results reflect the expected pattern as the hospital lies within Central Province and the Kikuyu and Luo form the two major ethnic groups in Kenya.

Presenting Symptoms

Presenting symptoms are outlined in Table 3. Dizziness was the most common complaint encountered with a frequency of 95.2% of the patients. Fainting was observed in 49.2% while weight loss was noted in 79.4%.

Clinical Presentation

All patients had pallor and this was the most important basis for a presumptive diagnosis as shown in Table 4, (Fig.2). Wasting (Fig.3) was observed in (71.4%) of patients and was an important feature in patients with malnutrition and underlying malignancy. Papillary atrophy (Fig.4) of the tongue was observed in 41.3% of patients, a finding which did not correlate with the degree of pallor or type of anaemia.
**TABLE 3**

Frequency of symptoms at presentation

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dizziness</td>
<td>60</td>
<td>95.2</td>
</tr>
<tr>
<td>Fainting</td>
<td>31</td>
<td>49.2</td>
</tr>
<tr>
<td>Weight loss</td>
<td>50</td>
<td>79.2</td>
</tr>
<tr>
<td>Haematuria</td>
<td>2</td>
<td>3.2</td>
</tr>
<tr>
<td>Haematochezia</td>
<td>10</td>
<td>15.9</td>
</tr>
<tr>
<td>Chronic cough</td>
<td>4</td>
<td>6.3</td>
</tr>
<tr>
<td>Epigastric pain</td>
<td>17</td>
<td>27.0</td>
</tr>
<tr>
<td>Jaundice</td>
<td>2</td>
<td>3.2</td>
</tr>
<tr>
<td>Painful tongue</td>
<td>3</td>
<td>4.8</td>
</tr>
<tr>
<td>Others (diarrhoea, bone pain)</td>
<td>14</td>
<td>22.0</td>
</tr>
</tbody>
</table>
## Major clinical findings on general examination

<table>
<thead>
<tr>
<th>CLINICAL FEATURES</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pallor</td>
<td>63</td>
<td>100</td>
</tr>
<tr>
<td>Wasting</td>
<td>45</td>
<td>71.4</td>
</tr>
<tr>
<td>Tongue Papillary atrophy</td>
<td>26</td>
<td>41.3</td>
</tr>
<tr>
<td>Oedema</td>
<td>7</td>
<td>11.1</td>
</tr>
<tr>
<td>Lymphadenopathy</td>
<td>3</td>
<td>4.8</td>
</tr>
<tr>
<td>Koilonychia</td>
<td>2</td>
<td>3.2</td>
</tr>
<tr>
<td>Others (Bone Pain, Hepato/splenomegaly)</td>
<td>3</td>
<td>4.8</td>
</tr>
</tbody>
</table>
Patient with a low haemoglobin (Hb < 5 g/dl) presenting with severe pallor as indicated by the tongue.
Patient with marked wasting and anaemia. Note wasting of biceps muscles and inability of patient to support himself due to weakness.
Tongue in anaemic patient with raw surface and papillary atrophy.
Koilonychia in finger nails of elderly patient with iron-deficiency anaemia.
Lymphadenopathy, observed in 3 patients, was a common feature especially in infections and neoplastic disorders. Koilonychia (Fig.5) was an infrequent finding observed in only two patients, and in both cases was associated with severe iron deficiency anaemia.

Other findings such as bone pain and hepatosplenomegaly were observed in three patients (4.8%).

**Haematological parameters**

The haemoglobin level ranged from 3.0 gdl$^{-1}$ to 12.0 gdl$^{-1}$ with a mean of 7.85 gdl$^{-1}$ and standard deviation of 2.90 (Table 5).

**Type of anaemia**

The type of anaemia was determined from the haematological data according to MCV, peripheral blood film (FIG 10-12) and bone marrow examination (FIG 13, 14).

In 63 patients who had complete parameters determined, iron deficiency was found to be the most common single type of anaemia, being observed in 22 (34.9%) of the cases as shown in Table 6.
<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mean</th>
<th>Deviation Std.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>HB</td>
<td>7.85</td>
<td>2.90</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>PCV</td>
<td>23.38</td>
<td>7.91</td>
<td>11</td>
<td>41</td>
</tr>
<tr>
<td>WBC</td>
<td>11.20</td>
<td>7.47</td>
<td>4</td>
<td>49</td>
</tr>
<tr>
<td>RBC</td>
<td>2.99</td>
<td>0.95</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>MCH</td>
<td>26.28</td>
<td>5.36</td>
<td>15</td>
<td>40</td>
</tr>
<tr>
<td>MCV</td>
<td>63.80</td>
<td>31.26</td>
<td>60</td>
<td>111</td>
</tr>
<tr>
<td>MCHC</td>
<td>32.29</td>
<td>-</td>
<td>28</td>
<td>37</td>
</tr>
</tbody>
</table>
### Distribution of patterns on Peripheral blood film.

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normocytic Normochromic</td>
<td>29</td>
<td>46.0</td>
</tr>
<tr>
<td>Microcytic Hypochromic</td>
<td>22</td>
<td>34.9</td>
</tr>
<tr>
<td>Macrocytic</td>
<td>7</td>
<td>11.1</td>
</tr>
<tr>
<td>Haemolytic</td>
<td>2</td>
<td>3.2</td>
</tr>
<tr>
<td>Dimorphic</td>
<td>3</td>
<td>4.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>63</td>
<td>100</td>
</tr>
</tbody>
</table>
A large number (46%) had a normocytic normochromic type of picture (Table 6) which is consistent with a picture expected in anaemia of chronic illnesses. A large number of patients (25.4%) had a normal bone marrow (Table 7, Fig 6) and this was noted to be associated with a normocytic normochronic peripheral blood film pattern.

Seven patients (11.1%) were confirmed to have megaloblastic anaemia. Of these, 5 had an assay of red cell and serum folate and vitamin B performed. Two samples had haemolysed and were therefore unsuitable for analysis. Four patients (6.3%) had folate deficiency while one patient (1.6%) had B deficiency. 12

There was a statistically significant difference in serum folate levels between patients and controls (Fig. 7) when subjected to Fischers Exact Test (P < 0.05). No such significance was observed in B12 and red cell folate levels (Significance levels P=0.263 and P=0.1514 respectively all greater than P=0.05 (Fig. 8,9).
Table 7

Frequency of features on bone marrow aspirate.

<table>
<thead>
<tr>
<th>FEATURE</th>
<th>NO. OF PATIENTS</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron deficiency</td>
<td>22</td>
<td>34.9</td>
</tr>
<tr>
<td>Megaloblastic</td>
<td>7</td>
<td>11.1</td>
</tr>
<tr>
<td>Haemolytic</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>Depression</td>
<td>3</td>
<td>4.7</td>
</tr>
<tr>
<td>Normal</td>
<td>16</td>
<td>25.4</td>
</tr>
<tr>
<td>Reactive</td>
<td>10</td>
<td>15.9</td>
</tr>
<tr>
<td>Increased iron</td>
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<td>8.0</td>
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</table>
Normal bone marrow cytology. Note myelocyte (A); late normoblast (B); and band forms (c).
Fig. 7 Graph of Serum Folate Levels in Patients presenting with megaloblastic anaemia
Fig. 8 Graph of Vitamin B₁₂ Serum Levels in patients presenting with Megaloblastic anaemia.

KEY:
A = Patients
B = Control
—— Limits of Normal
— Average
Graph of Red Cell Folate Levels in patients presenting with megaloblastic anaemia

KEY:
A - Patients
B - Control
--- Limits of Normal
--- Average
Hypochromic microcytic anaemia in patient with iron deficiency.
Fig. 11

Hypersegmented neutrophil in megaloblastic anaemia
Oval macrocytes in peripheral film of patient with megaloblastic anaemia.
Fig. 13

Micronormoblast in iron deficiency anaemia in bone marrow.
Irregular cytoplasmic margin. Irregular nucleus; some pyknotic changes, features of dyserythropoiesis in a patient with megaloblastic anaemia.
Despite wide variations in serum folate levels (Fig 7) clustering was observed at lower limits of normals in controls. This was similarly observed in red cell folate levels (Fig.9).

Two patients had a haemolytic anaemia, one due to malaria which was severe and did not respond to standard therapy while the other had features of antimmune haemolytic anaemia. A dimorphic pattern of anaemia was observed in 4 (6.4%) of patients Table 6. The causes in this group was multifactorial.

Parasites

Hookworm was the most common infection, being evident in 50% of the stools examined. No active cases of Schistosoma haematobium or mansoni were observed.

Diet

Carbohydrates and cereals formed the major proportion of the staple diet with 68.3% proportion of the daily meal (Fig. 15). Green vegetables composed 4.3% while meats and fruits were eaten sparingly 1.6% and < 1% respectively. Roots and tubers were uncommon ingredients in the diet.
Fig. 15  Daily dietary ratio of foods eaten by patients.

- MEAT/MEAT PRODUCTS - 1.6%
- BEANS - 6.3%
- ROOTS - 1.6%
- MILK AND MILK PRODUCTS - 12.0%
- VEGETABLES - 14.3%
- CEREALS/CARBOHYDRATES - 68.3%
Associated Systemic Disease

Gastrointestinal diseases formed the majority (30.2%) while respiratory (7.9%) and cardiovascular (6.4%) diseases were in the minority (Fig.16). As noted in Table 8, malignancies of the gastrointestinal system accounted for 17.5% of presenting disease.

Tumours of the genitourinary and haematological systems on the other hand constituted 9.6% of diseases (Table 9).

Patient Management

A record of treatment commenced is shown in Table 10. Nine patients (14.3%) were started on injections of B₁₂. It will be noted that patients with megaloblastic anaemia seem to have been treated with both Vit. B₁₂ and folic acid. This practice was the same for those with dimorphic patterns. Patients with iron deficiency also occasionally received folate therapy hence the 10 patients (15.9%). Only 11 patients (17.5%) were transfused within 24 hrs of arrival. Unavailability of blood often delayed treatment. All patients were commenced on a balanced hospital diet.
Fig. 16 Frequency distribution of associated systemic disease

- 6.4 Cardiovascular disease
- 7.9 Pneumonia (Respiratory disease)
- 8.2 Others (diabetes, multiple myeloma)
- 10.5 Neurological disease
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- 30.2 Gastrointestinal disease
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Frequency distribution of gastrointestinal malignancies.

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Frequency distribution of tumours affecting the genitourinary and haematological systems.

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The study demonstrates that a total of 75 patients (11%) out of a total of 664 who were 60 years of age and over, admitted during the period of study suffered from anaemia. Anaemia therefore is an important finding in elderly patients admitted to Kenyatta National Hospital.
The true incidence is underestimated as many patients suffering from anaemia may not have access to health facilities. In addition Kenyatta Hospital is a referral institution and only the most deserving cases are often given priority.

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Not all patients were admitted due to symptomatology related to anaemia. Patients having borderline anaemia were often admitted with underlying systemic illnesses. Symptoms found correlated well with those observed elsewhere (28,37).

Weight loss was a common symptom in 79.4% of the patients. This reflects the significance of underlying
malignancies and malnutrition in this age group. (Fig 11, Table 8, 9). No clinical features distinguished the megaloblastic types from the others, though certain features, such as raw tongue, vitiligo and white hair were more common in patients in these types (37).

The presence of hepatosplenomegaly, though uncommon in this study strongly suggested an underlying gastrointestinal malignancy. For example, the two patients who had hepatosplenomegaly died.

**Aetiology and Types of anaemia**

Gastrointestinal diseases were the most commonly observed (Fig 16). The predominance of gastrointestinal lesions has also been described in other studies (38).

Cardiovascular and other systemic diseases were less common as accompanying diseases. Hookworm was noted in 50% of stools, however the role of hookworm anaemia in this age group requires sample studies with emphasis on hookworm loads to determine cause effect relationships.
Iron-deficiency anaemia was noted in 34.9% of cases especially in patients with hookworm and accompanying or isolated gastrointestinal disease. This confirms the expected finding in lesions precipitating chronic blood loss. This type of anaemia has been found to be equally common in other age groups often occurring with accompanying malnutrition (2, 8-14) and is undoubtedly the single most common cause of anaemia.

Read et al suggested that folate deficiency might be common in the elderly and important as a cause of anaemia (39). Thomson et al (40) were unable to confirm this and other workers showed frequent association with iron deficiency anaemia (32). This study demonstrates the predominance of folate deficiency as a cause of megaloblastic anaemia and confirms the lesser role of Vitamin B₁₂ deficiency (29). The unbalanced diet observed amongst the patients is consistent with this observation though precise intake quantities were difficult to assess.

Folate deficiency may occur with no evidence of anaemia as observed in controls (Fig 7). This finding has important implications with regard to malnutrition...
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**Diet**

Foods consumed by patients were varied in types and quantity. Kenyan diets are known to be prepared in many different ways (42-44). It is therefore difficult to draw firm conclusions based on individual intakes and proportions. It is notable however that carbohydrates and cereals form the main staple diet with stews prepared from vegetables and rarely meat. Carbohydrate sources are varied, most common however is maize meal, bread, chapati and various other corn and wheat preparations. Vegetables are often varied in type but are often green and rich in vitamins and minerals before preparation.
Cereals and carbohydrates constituted 68.3% in proportion of daily meals. Of great importance are the generally poor sources of iron that this staple provides. Bread, chapati and other wheat based cereals are examples of such iron sources (45-47). Vegetables however provide a better source of iron (48), but constituted only 14.3% of daily food rations. Iron from meats sources tends to be of greater nutritional value (49) but again it will be noted that less than 1.6% of the daily food ration is composed of meats.

The African diet has been described as often bulky and rich in phytates and phosphates (17) and these play important roles in reducing the quantity of iron available for absorption. Fruits and fruit juices are often taken in between meals and their exact preparation is difficult to ascertain. As dietary ratios were based on 24-hr recalls, intermittent snacks of fruit were at times difficult to recall.

It is important to observe that these constitute less than 5% of the average Kenyan diet (50) and as ascorbic acid is important in promoting dietary iron absorption, it is an important factor to note. The
diet is hence of poor nutritional value with respect to iron and vitamin B\textsubscript{12}. Inadequate intakes and doubtful methods of preparation of vegetables may account for low folate levels.
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Conclusions drawn from the study are the following:

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2) Hookworm may play an important role especially in iron deficiency anaemia.

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4) Folate deficiency contributes significantly to megaloblastic anaemia. Vitamin B deficiency is less common.

5) Gastrointestinal disease is the major systemic disorder associated with anaemia in patients of this age group.
RECOMMENDATIONS

Following conclusion of the study, the following recommendations were made:

a) Further work needs to be done to assess the folate and vitamin B status in patients with iron deficiency to determine this presence and frequency of multiple haematinic deficiencies.

b) To assess the contribution of hookworm to the aetiology of iron deficiency anaemia in the elderly patients.

c) Reasses the importance of vitamin C with a view to its use in treatment in cases of iron deficiency anaemia.

d) It was noted that management of patients could have been greatly facilitated with improved availability of blood units for transfusion and diagnostic facilities to allow for discrimination between the different types of
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Percentate of total
**TABLE 8**

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Frequency distribution of tumours affecting the genitourinary and haematological systems.

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45. Elwood et al - Elwood et al at 1970-

46. Layrisse, M., Martininez-Torres, C.

47. Moore, C.V.

48. FAO/WHO
ANAEMIA IN ELDERLY PATIENTS

NAME .............................. AGE  SEX

Home of ethnic origin ..................

a) HISTORY Code: Present - 1 Absent 0

Presenting complaints
Dizziness
Fainting
Weight loss
Blood in urine
Blood in stool
Chronic cough
Coughing blood
Epigastric pain/discomfort
Yellowness of eyes
Tongue pain/swelling
Other specify ..........................

b) DRUG HISTORY Code: Used - 1, not used 0

Asprin
Others - specify ..........................

c) SOCIAL HISTORY Code: Present - 1 Absent 0

Smoking
Alcohol
d) **OBSTERIC HISTORY**  Code: Present 1, Absent No. 0

Blood stained/Frank blood discharge

Others - specify ........................................


e) **DIETARY HISTORY**

Code: Not eaten 0

- Eaten frequently 1 (daily)
- Eaten occasionally 2 (weekly)
- Eaten rarely 3 (Over weekly intervals)

<table>
<thead>
<tr>
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<th>Lunch</th>
<th>Supper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetables</td>
<td></td>
<td></td>
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<tr>
<td>Carbohydrates (bread ugali)</td>
<td></td>
<td></td>
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<tr>
<td>Meat</td>
<td></td>
<td></td>
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<tr>
<td>Pure vegetarian diet only</td>
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<tr>
<td>Milk/milk products</td>
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<tr>
<td>Roots (yams/cassava)</td>
<td></td>
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<tr>
<td>Beans</td>
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</tbody>
</table>

Others specify ........................................
PROFORMA II

CLINICAL EXAMINATION

General examination  Code: Present - 1, Absent- No. 0

1. Wasted
   Pale
   Tongue swelling or atrophic changes
   Oedema
   Lymphadenopathy
   Cyanosis
   Koilonychia

   Others specify ..................................

Systemic Examination  Code: Present -1, Absent - 0

Does the patient have accompanying:-

1) Cardiovascular disease?
   Specify ...........................................

2) Genito-urinary disease?
   Specify ...........................................

3) Neurological disease?
   Specify ...........................................

4) Respiratory disease
   Specify ...........................................

5) Gastro-intestinal disease
   Specify ...........................................

6) Haematological disorder
   Specify ...........................................
PROFORMA III

LABORATORY FINDINGS  Code: Present -1, Absent - No. 0

a) Stool

Blood

Hookworm Ova

Others ................................................

b) Urine

Frank/microscopic haematuria

Others ................................................

c) Peripheral Blood Film

1) Parasites

a) Malaria

b) Others .............................................

2) Normocytic

Normochronic

3) Microcytic

Hypochronic

4) Megalocytic

5) Haemolytic features

6) Others – specify .................................

d) Coulter Indices (specify figures) ............

i) P.C.V. .............................................

ii) Hb..............................................

iii) W.B.C. Count ..................................

iv) R.B.C. Count ..................................

v) MCH .............................................
vi) MCHC ................................................

Other relevant indices (specify) .................

e) Bone Marrow Findings Code: Present -1, Absent No 0

i) Iron depleted - confirm iron deficiency

ii) Megaloblastic - confirm nutrional deficiency

iii) Suggestive of Haemolytic picture

iv) Bone Marrow depression

v) Normal

vi) Others - Specify ..............................

f) Optional Investigations - Specify ............

a) In Megaloblastic Anaemia

Serum Vitamin B₁₂ ..............................

Folate ...........................................

b) In Haemolytic Anaemia

i) Serum Bilirubin .............................

ii) Urobilinogen ..............................

iii) Coombs test ..............................

iv) Sickling test ..............................

v) Haemoglobin Electrophoresis ..............

Others - Specify ..............................

Trephine biopsy (in bone marrow depression)

Specify ........................................

c) Lymph nodes or tissue biopsy - in confirming malignancy

Specify ........................................
d) Endoscopy in upper GIT haemorrhage ..........
   Specify ....................................................

e) Other contributory investigations done:-
   Specify ....................................................

Progress and management (specify)

   Code: Present - 1, Absent - No. 0

   a) Died within 1 week
   b) Died within 1 month
   c) Managed and discharged for follow up successfully
   d) Managed on supportive therapy