THE INCIDENCE AND TREATMENT OF IRON-DEFICIENCY ANAEMIA IN AN AFRICAN GENERAL PRACTICE

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The purpose of this paper is threefold:

(a) To establish the incidence of anaemia in an African general practice.

(b) To discuss the sex distribution of anaemia as seen in such a practice.

(c) To discuss the indications for the treatment of iron-deficiency anaemia in general practice.

1,000 consecutive cases of patients between the ages of 15 and 80 years were studied. Haemoglobin concentration was estimated in all patients by the use of the 'Hb-meter' of the American Optical Company. In anaemic patients red-blood-cell counts, packed-cell volume, and blood smears, were determined by conventional techniques.

The mean corpuscular haemoglobin concentration (MCHC) was estimated from the formula:

$$\text{MCHC} = \frac{\text{Haemoglobin concentration (G per 100 ml.)} \times 100}{\text{Packed-cell volume}} \%$$

Stool examinations for hookworm infestation were carried out in anaemic cases where no obvious cause could be found for the anaemia.

The criteria used to define *iron-deficiency anaemia* were as follows:

(a) A good history concerning chronic or recurrent bleeding or recent profuse bleeding is essential in determining anaemia. Very often patients present a vague ill-defined history of weakness and tiredness. In many cases a history is given reluctantly, for by African custom it is the duty of the physician to divine the cause of the illness without a history of the complaints. The final analysis of such cases is very often that of an apparently healthy patient who is 'neurotic'. In such cases and without previously determining the haemoglobin level, one may be inclined unnecessarily to prescribe tranquillizing drugs. A high index of suspicion of anaemia will in many cases prevent this practice. The onset of congestive cardiac failure in undiagnosed anaemic patients serves as a belated reminder of the continuing need for vigilance in general practice.

(b) A haemoglobin level below normal, a characteristic blood smear of poorly haemoglobinized red cells that are smaller in diameter than the normal, and an abnormally low MCHC (usually less than 30%), are of importance in the assessment of an anaemic patient. To describe a patient as pale without a haemoglobin determination and to treat such a patient for anaemia is open to error. It is of the utmost importance if treatment is to be rational to have an accurate measurement and description of the degree of pallor.

(c) The clinical findings of pallor, brittle nails, koilonychia and atrophy of the tongue are useful signs in the diagnosis of iron-deficiency anaemia. The last three of these signs usually mean that the anaemia is at least of 2 years' standing. Dysphagia is a rare and much later development. In the African, carcinoma of the oesophagus, and not anaemia, seems to be the commonest cause of dysphagia.

The following are the *main causes* of *iron-deficiency anaemia*:

1. *Blood loss.* This should be considered as the cause of the anaemia until the contrary is proved. The loss of blood may be obvious to the patient in the form of recurrent epistaxis, menorrhagia, or bleeding haemorrhoids. Occult blood loss through the alimentary tract is commonly present in cases of hookworm infestation, malignant disease, and peptic ulcer. In this study the stool was not examined for occult blood loss. It is worth while mentioning that in cases of external bleeding many patients were not alarmed at the loss of blood, believing that this is a sign of good health.

2. *Dietary insufficiency.* Inadequate intake of iron is seen particularly in women of the child-bearing age, especially if the menses are inclined to be heavy or if there have been several successive pregnancies. It is also a common cause of anaemia in the elderly patient who through illness or poverty or both is not getting enough to eat.

3. *Malabsorption,* as seen in cases of Crohn's disease or ulcerative colitis, is a rare cause. Baird and Wilson[1] have shown that in post-gastrectomy patients with iron deficiency the uptake of medicinal iron is better than that of dietary iron.

RESULTS

For the purpose of this article anaemia is considered as a haemoglobin level of 10·2 G or less per 100 ml. of blood. Of the 1,000 consecutive cases, unselected except for age, 310 were male and 690 female. Anaemia was found in 202 cases (20·2%). Of these 18 (1·8%) were male and 184 (18·4%) female, 5·8% of the males and 26·7% of the females being anaemic. Fig. 1 shows the distribution of the haemoglobin concentration in the whole series. It will be observed that in Fig. 1 and in Tables I and II haemoglobin levels below 4 G per 100 ml. have not been estimated, the lower limit of the 'Hb-meter' being 4 G per 100 ml. Fig. 1, therefore, does not show the distribution of haemoglobin concentrations below 4 G per 100 ml. and, for the same reason, in Tables I and II, which show the probable causes of the anaemia in the different sexes, the average haemoglobin concentrations are approximate.

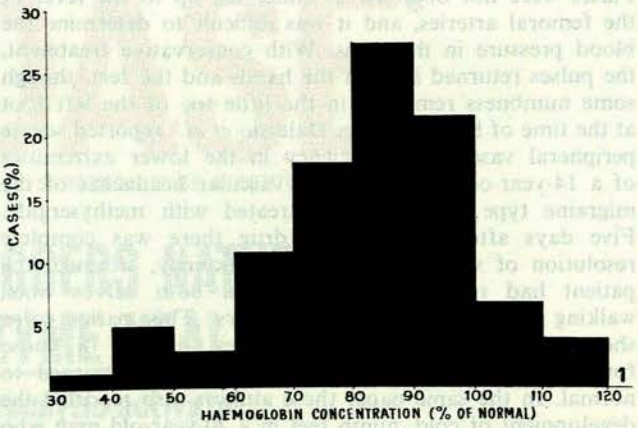

Fig. 1. Histogram showing distribution of the 1,000 African cases according to haemoglobin concentrations. (100% haemoglobin = 14·6 G. per 100 ml.)

Anaemia in the African Male

The distribution of anaemia in the African male is shown in Table I. Anaemia is not common in the African male. Forshaw[2] estimates that only 4 - 8% of all patients with idiopathic iron-deficiency anaemia are males. Leonard[3] found an incidence of 1·1% among Royal Air Force recruits.

Table I shows the probable causes of the anaemia in the 18 anaemic males in the 1,000 consecutive African patients of both sexes. Of the 18, 10 showed clinical or radiological evidence of tuberculosis in the chest. 5 of the 10 showed no clinical evidence of tuberculosis. All 5 presented with a cough, with or without blood in the sputum, normal temperature, moderate anaemia (9 - 10 G per 100 ml.) and tachycardia. Chest X-ray plates of these 5 patients showed evidence of pulmonary tuberculosis or pleural effusion.

TABLE I. DISTRIBUTION OF ANAEMIA IN THE AFRICAN MALE ACCORDING TO PROBABLE CAUSE

No. of cases	*% of male cases*	*Probable diagnosis*	*Average Hb in G per 100 ml.*	*Hb range*
10	55·6	Pulmonary tuberculosis and pleural effusion	8·5	8·5–10·0
5	27·8	Hypertensive epistaxis	7·3	<4·0–10·0
3	16·7	Undiagnosed*	10·0	9·8–10·2
18	100·0			

*i.e., no cause found for the anaemia.

Anaemia in the African Female

Table II shows the probable causes of anaemia in the 184 anaemic females in the 1,000 consecutive African patients of both sexes. This Table reflects a high proportion of cases of anaemia related to disturbances of menstruation and to abortion. It is not uncommon to find an African female in the child-bearing age with a haemoglobin level as low as 6·0 G per 100 ml. still gainfully employed and working up to 8 hours a day. The finding of a low haemoglobin level in an expectant African female before the 3rd trimester of pregnancy was not uncommon.

TABLE II. DISTRIBUTION OF ANAEMIA IN THE AFRICAN FEMALE ACCORDING TO PROBABLE CAUSE

No. of cases	*% of female cases*	*Probable diagnosis*	*Average Hb in G per 100 ml.*	*Hb range*
78	42·4	Abortion	7·5	<4–9·5
62	33·7	Pregnancy	9·5	5·0–10
21	11·4	Menorrhagia	8·0	<4–10
15	8·2	Undiagnosed	10	6·0–10·2
5	2·7	Hypertension ..	7·5	<4–10
3	1·6	Pulmonary tuberculosis	9·1	8·5–10
184	100·0			

It is suggested that such pregnant cases were anaemic before conceiving and that the pregnancy further aggravated the anaemia. According to Houston[4] twice as much extra iron is needed in pregnancy as in normal menstruation.

It appears reasonable in this community to adopt the now widely recommended practice of the routine administration of oral iron to all pregnant females. 'The present trend in the management of pregnancy anaemia thus seems to be that treatment should always be applied if the haemoglobin level falls below 10·0 grams per 100 millilitres (70%) and that the treatment in the last three months might well include the administration of folic acid as a prophylactic against possible development of megaloblastic anaemia.'[5]

TREATMENT

1. *Choice of Patients*

The treatment of the patient and not his haemoglobin level was the guiding principle used to select patients suitable for treatment outside hospital. The following list indicates what classes were considered unsuitable for treatment outside hospital.

(*a*) A sole breadwinner in the family with a very low haemoglobin was referred to hospital, where judicious blood infusions would raise the haemoglobin to a satisfactory level. The patient was thus able to return to work as soon as possible, and then oral iron preparations were given if indicated.

(*b*) Cases of incomplete abortion, irrespective of the haemoglobin level, were referred to hospital for treatment. After dilatation and curettage, follow-up treatment with suitable iron preparations was encouraged if indicated.

(*c*) Recurrent cases of epistaxis not controlled by conservative measures were referred to hospital for possible nasal cauterization.

(*d*) Cases of persistent menorrhagia severe enough to warrant hysterectomy were referred to hospital.

(*e*) Patients with congestive cardiac failure and anaemia in whom the response to digitalis and iron preparations was poor.

(*f*) Patients in whom there was no response to treatment with oral iron preparations after 2 weeks of treatment were referred to hospital for further investigation.

(*g*) Anaemic cases with attacks of phlebitis were referred to hospital without initial treatment with oral iron. It is suggested by Byrd and Cooper[6] that phlebitis is a frequent complication of iron-loading anaemia. In such cases the anaemia is hypochromic but refractory to treatment with iron. No case of phlebitis with anaemia was encountered in the present study.

(*h*) Severe cases of anaemia in the last trimester of pregnancy were referred to hospital.

(*i*) All anaemic cases of tuberculosis, proved or suspected, were considered unsuitable for treatment in general practice.

2. *Diet*

Dietary measures aimed at improving the haemoglobin level were not considered, because diet alone cannot raise the haemoglobin level to normal in iron-deficiency anaemia.

3. *Choice of Iron Preparation*

The practice of using 'blunderbuss' therapy in the treatment of anaemia is to be strongly condemned as being irrational and potentially dangerous, for it may well mask the diagnosis of megaloblastic anaemia and may in cases of vitamin-B_{12} deficiency lead to neurological disease. Preparations containing iron, vitamin B_{12}, vitamin C and folic acid all made into one 'blunderbuss' tablet are to be avoided at all costs. There are many organic iron salts and chelating iron preparations on the market, and claims are made for the efficacy of all of them on the grounds of (*a*) less gastro-intestinal irritation, (*b*) quicker haemoglobin replacement, and (*c*) little or no resulting intolerance.

O'Sullivan *et al.*[7] found ferrous sulphate, ferrous succinate and ferrous gluconate to produce approximately equal and satisfactory responses, and ferric hydroxide to be less effective. They reported intolerance in 13% after ferrous sulphate and only in 4% after ferrous succinate and gluconate. Kerr and Davidson,[8] however, using a 'double blind' technique in healthy non-pregnant women, indicate that psychological factors to a large extent determine intolerance in oral iron preparations. They conclude that 'ferrous sulphate raises the haemoglobin level as effectively as ferrous gluconate and ferrous succinate and, when given in comparable doses of elemental iron, is no more liable to cause side-effects.'

In controlled trials there seems to be no evidence that one preparation is superior to another. Moreover ferrous sulphate is cheap and should be the first choice in treatment. Only in cases of intolerance should other preparations be used. In this series, response to treatment with ferrous sulphate was found to be good, producing no intolerance in the form of vomiting, diarrhoea or epigastric discomfort.

4. *Duration of Treatment*

As soon as the anaemia is corrected treatment should cease. Continued treatment in non-anaemic cases may in the course of time lead to excessive iron storage as indicated by Smith and Pannacciulli.[9]

5. *Parenteral Iron Preparations*

The following are *indications* for their use:

(*a*) Intolerance to oral iron preparations.

(*b*) Gastro-intestinal diseases such as Crohn's disease and ulcerative colitis.

(*c*) Rheumatoid arthritis. Millard and Barber[10] have shown that there is a better response to parenteral iron than oral iron in some cases of rheumatoid arthritis.

(*d*) In patients who are too ill or too stupid to take one tablet of an oral preparation 3 times a day.

The following are *contraindications* to the use of parenteral iron:

(*a*) Failure to respond to oral iron. This is a definite indication to stop all treatment with iron.

(*b*) An urgent need to raise the haemoglobin level to normal within a specified time, as in the case of an anaemic woman in the last trimester of pregnancy. There is no evidence that parenteral iron raises the haemoglobin more rapidly than an oral preparation, and if speed is essential to life in the treatment of iron deficiency then blood infusions are indicated.

The following undesirable side-effects of parenteral iron preparations are recorded:

(*a*) Brown staining of the tissues around the site of the injection occurs with the use of both intramuscular and intravenous preparations.

(*b*) Intramuscular preparations are usually painful.

(*c*) Urticaria and other transient side-effects are recorded by Jennison and Ellis[11] and by Callender and Smith.[12]

(*d*) Alarm was caused when neoplastic changes in rodents at the site of the injection were reported by Richmond[13] after massive doses of 'imferon', and by Haddow and Horning.[14] Robinson *et al.*[15] reported the occurrence of a tumour in a patient at the site of the injection, but it is doubtful whether the tumour was not primary in the first instance. It should be remembered that intramuscular iron was used for well over half a century before the introduction of intravenous iron in 1947. It seems reasonable to conclude that in the absence of convincing documented evidence the administration of intramuscular iron is free from carcinogenic side-effects. According to Slack and Wilkinson[16] saccharated iron oxide for intravenous use is safe and free from side-effects.

SUMMARY

1. The material for this survey was extracted from routine general practice and should therefore give a fair measure of the true incidence of anaemia among Africans.

2. 1,000 consecutive cases selected only by age were studied.

3. Among the males 5·8% were anaemic and among the females 26·7%.

4. Emphasis is laid on the rarity of anaemia in the African male and its correlation with tuberculosis in males.

5. The indications for treatment of iron deficiency anaemia in general practice are discussed.

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