

HYPOCHROMIC ANAEMIA IN SOUTH AFRICA: A STUDY OF THE INCIDENCE IN THE TRANSVAAL 1955—56

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Is hypochromic anaemia uncommon among South African Bantu? Is it common among South African Whites? These questions prompted the study reported here. A survey of the cases of hypochromic anaemia diagnosed in one year in the haematology laboratory of this Institute was carried out.

PLAN OF STUDY

The laboratory at the time this study was undertaken was a regional one, drawing its material from many non-White hospitals on the Witwatersrand, and also from hospitals in the country districts from an extensive area of the Transvaal. Table I indicates the number of haematological in-

TABLE I. ANALYSIS OF BLOOD COUNTS DONE DURING THE PERIOD OF STUDY

	Whites	Bantu
Total blood morphology studies	42,684	11,974
Total of anaemias	6,428 (15%)	3,092 (26%)
Total of hypochromic anaemias	842	506
Percentage that hypochromic anaemias form of total morphological studies	2.0%	4.2%
Percentage that hypochromic anaemias form of total of anaemias	13.1%	16.4%

vestigations (morphological studies only) done during the period of survey, which was 1 year, from 7 September 1955 to 6 September 1956.

A copy of every haematological report issued by the Department is surveyed by the author for classification and record purposes. During the period of study every report indicating the presence of a hypochromic anaemia was noted and the following details recorded: Race, age, sex, haemoglobin value, and mean corpuscular haemoglobin concentration or degree of hypochromia. Only the first report on a case was recorded, repeat investigations being ignored. At the end of the period of survey the information recorded was transferred to punch cards for analysis.

Standard routine haematological methods were used in this survey. The haemoglobin was estimated as oxy-haemoglobin by a photo-electric colorimetric method. The packed-cell volume was estimated by the method of Wintrobe¹ (in preference to red-cell counts). The minimum investigation qualifying for inclusion in this report was the performance of a haemoglobin estimation with comment on the red-cell appearances on the stained film. These comments are made by medically qualified persons. For a diagnosis of hypochromic anaemia the report had to indicate the presence of an anaemia having regard to the age and sex of the patient and either (1) a mean corpuscular haemoglobin concentration below 31% or, if a packed cell volume had not been done, (2) an unequivocal statement of the

presence of hypochromia of the red cells as shown by inspection of the stained smear.

RESULTS

Case Rate of Hypochromic Anaemia

Among 42,684 blood counts on Whites (this total includes repeat counts done during the period) 842 initial diagnoses of hypochromic anaemia were made. During the period 6,428 cases of anaemia of all types (i.e. cases with a haemoglobin value below the normal range) were encountered, so that 13.1% of all anaemias amongst Whites were hypochromic.

11,974 blood counts (including repeat counts) were done on Bantus, and 506 cases of hypochromic anaemia were encountered among 3,092 cases of anaemia of all kinds, i.e. 16.4%.

It is thus seen that the occurrence of hypochromic anaemia in the hospital populations of the races studied is very similar; at all events the occurrence rate among Bantu hospital patients is not less than among Whites.

Analysis by Place of Residence

Although the manner of life of the Whites differs little fundamentally as between town and country, much is made of differences between urban Bantu and rural Bantu. The data was therefore analysed according to residence; (1) within Johannesburg municipal area, (2) outside Johannesburg municipal area, and (3) a special category for mine Natives, who are almost entirely migrant labour. Table II sets out

TABLE II. ANALYSIS BY RESIDENCE

Origin	Males	% Whites		Females	% Bantu	% Both Sexes	
		%	%			%	%
Johannesburg Municipal area	240	80	384	71	624	74	
Other	61	20	157	29	218	26	
Total	301	36	541	64	842	100	
Bantu							
Mines	107	—	—	—	107	21	
Johannesburg Municipal area	69	39	111	41	180	35	
Other	107	49	112	51	219	44	
Total	283	44	223	56	506	100	

the data so analysed. Of the Whites, 74% were from within the Johannesburg municipal area; of Bantu 35% were from the municipal area, 44% were from outside and 21% were mine workers. Unfortunately, without knowledge of the composition of the population sampled, it is impossible to say from these figures whether hypochromic anaemia is commoner in the urban Bantu or in the 'rural' Bantu. It is, however, possible to compare the severity of the anaemias found in the two groups (see below).

Age and Sex Analysis

(a) Whites. The sex ratio for Whites was M : F : : 1 : 1.8. Analysis according to age (Fig. 1) shows conspicuous differ-

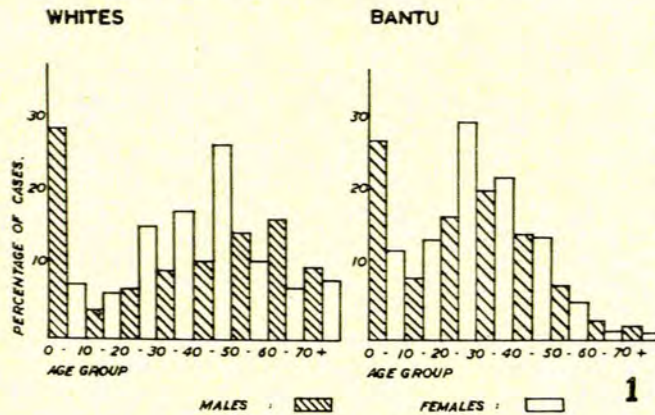


Fig. 1. Age and sex analysis by race.

ences in the distribution of the cases according to sex. There is a very high occurrence rate (almost 1/3rd of all the cases) in the under-10 age-group for males (Fig. 1). Table III sets out a more detailed analysis of the under-10 age-group. As would be expected, in females there is a high incidence in the 3rd and 4th decades with the peak incidence in the 5th decade; a sharp drop occurs in the 6th decade. In males, on the other hand, apart from the high incidence in childhood, there is a steadily increasing occurrence rate up to the 7th decade.

(b) Bantu. The sex ratio of the civil population (i.e. excluding mine Natives) was M : F : : 1 : 1.27. When analysed by age the figures show the same higher incidence in boys than in girls in the under-10 age-group observed in the Whites (Fig. 1 and Table III). The life-expectancy

TABLE III. ANALYSIS OF UNDER-10 AGE-GROUP BY AGE AND SEX

Age	Under 1	1-2	2-3	3-4	4-5	5-10
Whites						
Boys	27	19	3	0	0	4
Girls	6	11	2	6	1	1
Bantu						
Boys	12	10	5	5	2	10
Girls	3	3	5	2	0	9

curve for the Bantu is reflected in both the male and female hypochromic anaemia occurrence-rate curves. Thus, unlike the steadily climbing figures for White males, the incidence of hypochromic anaemia in the Bantu male reaches its peak (apart from the childhood one) in the 4th decade. Similarly, in Bantu women the incidence of hypochromic anaemia (probably due to gynaecological and obstetrical causes) reaches its peak in the 3rd decade. In both males and females the occurrence rate over the age of 50 is very small.

Severity of the Anaemia at Diagnosis in the Two Races

Table IV shows the severity of the anaemia present at initial diagnosis for the two races. The figures are very similar and do not suggest any great difference in the degree of anaemia necessary to make the individual, White or Bantu, seek medical care. The table may also suggest that the very many more blood counts done on Whites than on

TABLE IV. ANALYSIS OF SEVERITY OF ANAEMIA AT DIAGNOSIS

Haemoglobin Value at Diagnosis (GM%)	Whites		Bantu	
	No.	%	No.	%
Under 3	4	0.5	6	2.1
3.1-6	77	9.1	28	10.0
6.1-9	346	40.0	96	34.0
9.1-12	365	43.5	118	41.4
> 12	50	6.0	35	12.4

Bantu (3 times as many) represent so much time and money misspent; that is to say, that the apparently more elaborate care afforded to the Europeans failed to detect any more cases among them in the less severely anaemic categories.

Severity of the Hypochromia present at Diagnosis

Table VA shows the percentage of cases classified according to the MCHC i.e. according to the severity of the iron deficiency. The MCHC value was available in 433 White

TABLE VA. ANALYSIS OF DEGREE OF HYPOCHROMIA AT DIAGNOSIS

	MCHC <25.0% (Percentage)	MCHC 25.0-27.9% (Percentage)	MCHC 28.0-31.0% (Percentage)
White males	9.6	29.0	61.3
White females	9.0	31.2	59.7
Bantu males	7.0	19.0	73.0
Bantu females	2.5	31.3	66.1

TABLE VB. ANALYSIS OF DEGREE OF HYPOCHROMIA AT DIAGNOSIS BY PLACE OF RESIDENCE

	MCHC <25.0% (Percentage)	MCHC 25.0-27.9% (Percentage)	MCHC 28.0-31.0% (Percentage)
Urban White males	9.6	31.6	58.7
'Rural' White males	12.9	29.0	51.0
Urban White females	1.6	32.7	65.6
'Rural' White females	22.1	31.6	46.2
Urban Bantu males	3.2	21.7	75.0
'Rural' Bantu males	11.1	19.4	69.4
Bantu Mine workers	5.7	17.1	77.1
Urban Bantu females	—	23.1	76.8
'Rural' Bantu females	6.7	42.2	51.0

cases (52%) and in 214 Bantu cases (42%). The figures might suggest that a higher proportion of the most severely hypochromic anaemias occur in the Whites, but the possibility of bias in selection of the cases on which the packed-cell volume was done throws doubt on the validity of this suggestion. In a comparison of urban Bantu and 'rural' Bantu and urban Whites and other Whites (Table VB) it was apparent that the most severely hypochromic cases were 'rural' in both cases. This possibly suggests that both urban Whites and urban Bantu seek medical attention earlier than their 'rural' counterparts.

Analysis of Causation

This unfortunately was not possible in detail owing to the inadequacy of the information provided in the majority of cases by the clinician requesting the blood examination. However, among the 239 White males where a diagnosis was given, the commonest diagnosis were secondary haemorrhage (site unspecified) and haemorrhage from the gastro-intestinal tract, followed by infective conditions, mainly tuberculosis. This was followed closely by neoplastic conditions. No diagnosis of primary ('idiopathic') hypochromic anaemia was ventured. Diagnoses capable of classification were provided for 325 White female patients. Among these, secondary haemorrhage (site unspecified) was by far the commonest diagnosis given. Gynaecological bleeding was the next most frequent diagnosis but, interest-

ingly, it was equalled by gastro-intestinal haemorrhage. Anaemia associated with pregnancy was the next most frequent diagnosis given. 'Idiopathic' hypochromic anaemia was volunteered as a diagnosis in 5 cases.

In the Bantu a very different pattern is apparent. The first 4 most frequent diagnoses in 231 males were (1) infections (unspecified), (2) tuberculosis, (3) respiratory disease, and (4) gastro-intestinal haemorrhage. For 182 females the order was (1) infections, (2) tuberculosis, (3) gynaecological bleeding, (4) respiratory disease. It may be legitimate to wonder whether 'infections' and 'respiratory disease' are not synonyms for tuberculosis. If this were so, 43% of the Bantu female cases of hypochromic anaemia for whom diagnoses were given and 58% of the male cases may have been due to tuberculosis. The diagnosis of primary ('idiopathic') hypochromic anaemia was given once for a Bantu female patient, and twice for Bantu male patients. Of interest was the association of hypochromia with megaloblastic anaemia in 6 Bantu patients.

DISCUSSION

It is said that hypochromic anaemia is uncommon or even very rare among the Bantu.²⁻⁵ No adequate data have ever been brought forward to support this statement. So far as I am aware no survey of the occurrence rate of hypochromic anaemia in South Africa, either in Bantu or European, hospital cases or others, has been published. This survey has shown that in both races hypochromic anaemia constitutes a similar proportion of all the anaemias as seen in hospital populations in the Southern Transvaal. The condition therefore cannot be said to be rare or uncommon, although the populations studied did not permit assessment of true incidence for either racial group.

The overwhelming majority of cases of hypochromic anaemia result from blood loss. Cases due solely to deficiency of dietary iron are excessively rare, if in fact they ever occur. Malabsorption syndromes, e.g. steatorrhoea, account for a small number of cases of hypochromic anaemia.

The question of the so-called 'idiopathic hypochromic anaemia' is a vexed one. The author's opinion is that if it occurs at all it is an exceedingly rare condition, whether in White or Bantu and whether in South Africa or in Europe. In the great majority of cases perfectly adequate explanations can be found for the iron deficiency without invoking that cloak for ignorance, 'idiopathic'. It is possible that a proportion of these cases are in fact cases of malabsorption syndrome.⁶

The possibility that some cases of hypochromic anaemia (other than thalassaemia) may be due to failure to utilize

iron for haemoglobin synthesis in one on which there is little information. It is well known that conspicuous siderosis of many organs occurs in the Bantu.⁷⁻¹⁰ Whether this iron is available for haemopoiesis and whether evidence of hypochromia of the red cells only appears after these iron 'stores' are exhausted are questions which await answers.

Infection and sepsis are known to cause defective utilization of iron for haemoglobin synthesis.^{11,12} It would appear from this survey that infection may be a more important aetiological factor in the Bantu cases of hypochromic anaemia than in White cases.

The higher occurrence rate of hypochromic anaemia in boys, both White and Bantu, than in girls in the same age group, is of considerable interest and, apart from Woodruff,¹³ who last year reported similar findings from the USA, no other reference has been found. It seems likely to be due to the different growth rates of the male and female infant in the 1st year of life. Drabkin¹⁴ states that growth in haemoglobin in the 1st year is 40 GM for male infants and 30 GM for female infants. The rate of somatic growth is more rapid in boys than in girls. According to Jackson and Kelly,¹⁵ boys on an average gain 16 lb. in their first year of life as compared with 13 lb. in girls. The demand for iron, therefore, is greatest during the first year of life and this period shows the maximum incidence of hypochromic anaemia in childhood (Table III).

SUMMARY

The occurrence rate of hypochromic anaemia in White and Bantu hospital populations in the Southern Transvaal has been compared. Hypochromic anaemia is shown to be by no means rare in the Bantu. Sex and age differences and differences in severity in the two races are analysed. Possible aetiological factors are considered.

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