THE INCIDENCE OF HYPOCHROMIC ANAEMIA IN PREGNANT BANTU WOMEN

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In a recent investigation of the mean haematological values in pregnant European, Cape Coloured and Bantu women in Cape Town, Lanzkowsky[1] came to the conclusion that the incidence of hypochromic (iron-deficiency) anaemia was high in the three main racial groups. Previous results published by Gerritsen and Walker,[2] and latterly by Metz,[3] have indicated the converse, namely, that iron-deficiency anaemia is very uncommon in pregnant Bantu women. Both these investigations were carried out on subjects in the neighbourhood of Johannesburg, which may account in part for the difference.

In view of these conflicting reports and the importance of the problem, the present study was undertaken.

MATERIAL AND METHODS

Altogether, 194 pregnant Bantu women who attended the prenatal clinic at the Lady Selborne Mission Hospital near Pretoria were investigated. The subjects were therefore living at an altitude of approximately 4,500 feet above mean sea level. The cases were not selected and were consecutive patients who attended the clinic during a six-week period. In addition, 38 non-pregnant, clinically normal Bantu nurses, and 32 non-pregnant Bantu women who attended the same clinic as the pregnant women, were investigated. The pregnant and non-pregnant Bantu women were mostly domestic servants and can be considered as a socio-economically and educationally less-privileged group than the nurses.

Haemoglobin was determined as oxy-haemoglobin according to the method of King *et al.*[4] The red-cell count, packed-cell volume (PCV), and erythrocyte sedimentation rate (ESR), were determined according to standard methods.[5] In addition to these determinations blood smears were prepared and examined microscopically.

RESULTS

The pregnant women were divided on the basis of their length of pregnancy, and fell into 3 groups according to the 3 trimesters of pregnancy, viz. less than 20 weeks, 21 - 30 weeks and 31 - 40 weeks. The results of the haematological determinations on these patients are presented in Table I.

Two of the pregnant women (1·03%) had haemoglobin levels below 10 G. per 100 ml. The haematological values

TABLE I. HAEMATOLOGICAL VALUES OF PREGNANT BANTU WOMEN

Stage of pregnancy	*No. of cases*	*Haemoglobin (G. per 100 ml.)*	*Red-cell count (mill./c. mm.)*	*PCV (%)*	*MCHC (%)*	*MCV (cμ)*	*ESR (mm./hr.)*
<20 weeks	41	13·05* (11·0 - 16·7)**	4·21 (2·90 - 5·50)	36·9 (33 - 46)	34·6 (33 - 39)	87·3 (71 - 113)	36·7 (14 - 67)
21 - 30 weeks	60	12·40 (11·0 - 14·3)	3·98 (2·97 - 5·10)	35·3 (33 - 44)	34·4 (33 - 39)	87·6 (69 - 113)	41·9 (14 - 59)
31 - 40 weeks	93	12·40 (8·2 - 15·3)	3·99 (2·50 - 5·20)	37·4 (30 - 45)	32·6 (27 - 41)	94·4 (66 - 138)	42·3 (12 - 53)

PCV = packed-cell volume, MCHC = mean corpuscular haemoglobin concentration, MCV = mean corpuscular volume, ESR = erythrocyte sedimentation rate.
* Average value.
** Range.

of these 2 patients (A and B), both of whom were 38 weeks pregnant, were as follows:

	A	*B*
Haemoglobin (G. per 100 ml.)	8·9	8·2
Red-cell count (mill./c.mm.)	3,010,000	3,680,000
PCV (%)	30	30
MCHC (%)	29	27
MCV (cμ)	93	100
ESR (mm./hr.)	63	49

Hypochromic red cells were present in the peripheral blood smears of both patients.

The results obtained for the whole group of women were analysed statistically in order to determine whether significant differences occurred in the 3 trimesters of pregnancy (Table II).

The results presented in Table II show that the haemoglobin level decreased significantly from the early stages of pregnancy to the mid-term period and thereafter showed no significant change. A significant *increase* in the PCV occurred from the mid-term period to the end of pregnancy.

TABLE II. PROBABILITY LEVELS (TWO-TAILED)* FOUND IN COMPARISONS BETWEEN GROUPS OF PATIENTS AT DIFFERENT STAGES OF PREGNANCY

	Periods compared (weeks)		
	< 20 vs. 21 - 30	*21 - 30 vs. 31 - 40*	*< 20 vs. 31 - 40*
Haemoglobin	$P < 1\%$	$P > 5\%$	$P < 0{\cdot}6\%$
Red-cell count	$P > 5\%$	$P > 5\%$	$P > 5\%$
Packed-cell volume ..	$P > 5\%$	$P < 0{\cdot}1\%$	$P > 5\%$

* A probability level P (two-tailed) of 1% or lower should be regarded as indicating a significant difference.

In order to determine whether the number of their previous pregnancies had had any influence on the haematological values of these women, all the women were divided into groups according to the number of previous pregnancies (Table III). When the values found for the group of patients with no previous pregnancies were compared with those for the patients who had had 5 or more pregnancies, it became clear that a significant decrease had occurred in the PCVs of the multiparous group of patients ($P < 0{\cdot}5\%$, two-tailed). The haemoglobin levels and the red-cell counts of these two groups showed no significant differences ($P > 5\%$, two-tailed).

The results of the haematological determinations on 38 non-pregnant Bantu nurses and 32 Bantu women are presented in Table IV. It can be seen that neither the nurses nor the Bantu women had haemoglobin levels below 10 G. per 100 ml.

In Table V the haemoglobin, red-cell count, and haematocrit values of the Bantu nurses and non-pregnant Bantu women are compared with those of the whole group of 194 pregnant women.

These results (Table V) indicate that the haemoglobin, red-cell count, and haematocrit values of both the pregnant and non-pregnant Bantu women were significantly lower than those of the more privileged nurses. However, there were no significant differences between the haematological values of the pregnant and non-pregnant sections of the less-privileged group.

DISCUSSION

In the present study of 194 pregnant Bantu women, 2 (1·0%) had haemoglobin levels below 10 G. per 100 ml. Metz[3] investigated 147 pregnant Bantu women who attended the antenatal clinic at Baragwanath Hospital. An examination of his results shows that in no case was the haemoglobin level below 10 G. per 100 ml; the lowest being 10·6 G. per 100 ml.

Gatenby and Lillie,[6] citing the work of Dieckmann and Wegner,[7] regarded a haemoglobin concentration of 10 G. per 100 ml. for pregnant women as the lowest value which can be ascribed to hydraemia. If this standard is accepted, the incidence of anaemia in pregnant Bantu women is extremely low compared with that found in other population groups elsewhere in the world. In their study of 4,314 pregnant women in Dublin, Gatenby and Lillie[6] found that 1,027 (24%) had a haemoglobin value of less than 10 G. per 100 ml. Giles and Burton[8] also found a relatively high incidence of anaemia in pregnant women in North Staffordshire. Of the 1,479 patients investigated, 978 (66%) had haemoglobin levels below 80% (11·81 G. per 100 ml.), while in 217 cases the level was lower than 69% (67% = 10 G. per 100 ml.). In an investigation of haemoglobin values in 4,090 subjects in India and Ceylon and 3,020 in Africa, Foy and Kondi[9] found that 'anaemia was widespread and severe, particularly in pregnant women and mostly of the iron-deficiency type'. All these results are in marked contrast to the low incidence found in pregnant Bantu women.

In his investigation, Metz[3] found that the haemoglobin level and PCV decreased significantly from the early stages of pregnancy to mid-term. In the present study similar changes were found in the haemoglobin values. However, the PCV showed no significant decrease. A significant *increase* was in fact found from the mid-term period to

TABLE III. INFLUENCE OF PREVIOUS PREGNANCIES ON THE HAEMATOLOGICAL VALUES OF PREGNANT BANTU WOMEN

No. of previous pregnancies	*No. of cases*	*Haemoglobin (G. per 100 ml.)*	*Red-cell count (mill./c. mm.)*	*PCV (%)*	*MCHC (%)*	*MCV (cμ)*	*ESR (mm./hr.)*
Nil	47	12·46* (11·0 - 15·3)**	4·13 (2·99 - 4·98)	36·7 (33 - 44)	34·1 (33 - 42)	88·8 (55 - 105)	40·1 (17 - 67)
1	52	12·48 (8·2 - 16·7)	4·04 (3·01 - 5·50)	35·6 (30 - 46)	34·8 (27 - 41)	89·2 (71 - 120)	39·5 (17 - 63)
2	28	12·20 (10·2 - 13·7)	3·85 (3·39 - 3·75)	36·0 (32 - 41)	33·9 (31·8 - 38)	93·4 (75 - 117)	39·2 (12 - 52)
3	23	12·76 (10·5 - 15·0)	3·89 (2·67 - 4·89)	37·0 (32 - 42)	34·4 (32 - 41)	97·2 (73 - 138)	41·8 (27 - 60)
4	22	12·58 (10·0 - 14·6)	3·99 (3·56 - 4·60)	36·6 (30 - 43)	34·3 (33 - 41)	91·5 (76 - 107)	41·1 (17 - 58)
5 or more	22	12·09 (10·2 - 14·0)	3·88 (2·72 - 4·70)	34·3 (31 - 40)	34·8 (32 - 41)	88·9 (73 - 136)	44·7 (24 - 58)

For key see Table I.
* Average value.
** Range.

TABLE V. COMPARISON BETWEEN HAEMATOLOGICAL VALUES OF NON-PREGNANT BANTU NURSES AND WOMEN AND THOSE OF PREGNANT BANTU WOMEN

Group	*Subjects*	*Haemoglobin (G. per 100 ml.)*		*Red cell count (mill./c. mm.)*		*PCV (%)*	
		Average	*SD*	*Average*	*SD*	*Average*	*SD*
A	Non-pregnant nurses (38)	13·34	1·64	4·70	0·34	43·0	4·0
B	Non-pregnant women (32)	12·10	1·40	4·03	0·55	38·0	3·3
C	Pregnant women (194)	12·5	1·26	4·06	0·24	36·6	17·0

Comparison of groups	*P-values (two-tailed*)*		
A - B	0·1%	0·01%	0·01%
B - C	13·4%	30·2%	4·40%
C - A	0·5%	0·006%	0·006%

PCV = packed-cell volume, SD = significant difference
* Significant P-values (< 1%) are underlined.

TABLE IV. HAEMATOLOGICAL VALUES OF NON-PREGNANT BANTU NURSES AND BANTU WOMEN

	Non-pregnant Bantu nurses		*Non-pregnant Bantu women*	
	Average	*Range*	*Average*	*Range*
Haemoglobin (G. per 100 ml.)	13·34	10·9 - 16·6	12·1	10·3 - 14·5
Red cell count (mill./c. mm.) ..	4·70	4·0 - 5·8	4·03	3·9 - 5·3
PCV (%)	43·0	39 - 47	38·0	37 - 45
MCHC (%) ..	31·0	30 - 36	32·0	30 - 34
MCV (cμ)	91·5	75 - 100	90·5	88 - 105
ESR (mm./hr.) ..	10·0	2 - 15	22·3	3 - 35

For key see Table I.

the end of pregnancy. In their investigations, Gerritsen and Walker[2] found that the haematological values remained remarkably constant in a group of pregnant Bantu women during the course of pregnancy. Before these conflicting results can be fully explained, a more extensive study of the problem, including plasma-volume determinations, liver-function tests, and serum-iron studies will have to be undertaken. Such a study is in progress.

The fact that the haematological values of the pregnant women were lower than those of non-pregnant nurses, while no significant differences were found between the values for the pregnant women and those for a socio-economically and educationally similar group of non-pregnant women, indicates the danger of comparing groups which are not strictly comparable in all respects. Complete data on the dietary habits, medical background and nutritional status of the three groups of women would be needed before any conclusions about the possible influence of pregnancy on the haematological values of Bantu women could be regarded as justified.

The present study was not planned to investigate possible factors which might have been responsible for the extremely low incidence of hypochromic anaemia in pregnant Bantu women. In this connection Walker and Arvidsson[10] have suggested that the high iron intake of the Bantu may be of significance. In order to clarify the situation it is obvious that more complete investigations, including accurate estimations of iron intake, will have to be made.

SUMMARY

Preliminary haematological studies were carried out on 194 pregnant and 70 non-pregnant Bantu women. According to accepted standards, only 2 of the pregnant women showed frank anaemia of the hypochromic type. This incidence of 1·0% is much lower than that reported elsewhere in the world.

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