ANAEMIA IN PREGNANCY MATERNAL AND PERINATAL OUTCOME IN IBADAN, SOUTH WESTERN NIGERIA.

David O. Awonuga[1], Akintunde A. Odukogbe[2], Oladapo Olayemi[2], Adenrele O. Adeniji[3].
Department of Obstetrics and Gynaecology, Federal Medical Centre, Abeokuta, Ogun state.
Department of Obstetrics and Gynaecology, University College Hospital, Ibadan
Department of Obstetrics and Gynaecology, LAUTECH Teaching Hospital, Osogbo.

Authors

1. **Awonuga D.O. MBBS, FWACS, FMCOG, MSc. (Human Reproductive Biology).** Consultant Obstetrician & Gynaecologist, Department of Obstetrics and Gynaecology, Federal Medical Centre, Abeokuta, Nigeria. (Formally, Senior Registrar, Department of Obstetrics & Gynaecology, University College Hospital, Ibadan, Nigeria.)

2. **Odukogbe A.A**. **MBBS, FWACS, FMCOG, MCommH.** Lecturer, Department of Obstetrics and Gynaecology, University of Ibadan and Consultant Obstetrician & Gynaecologist, University College Hospital, Ibadan, Nigeria.

3. **Olayemi O**. **MBBS, FWACS, FMCOG, MPH.** Lecturer, Department of Obstetrics and Gynaecology, University of Ibadan and Consultant Obstetrician & Gynaecologist, University College Hospital, Ibadan, Nigeria.

4. **Adeniji A.O**. **MBBS, FWACS, FMCOG.** Lecturer, Department of Obstetrics and Gynaecology, Ladoke Akintola University of Technology and Consultant Obstetrician & Gynaecologist, LAUTECH Teaching Hospital, Osogbo, Nigeria.

Correspondence:
David O **AWONUGA**
Department of Obstetrics and Gynaecology, Federal Medical Centre, Abeokuta. P.M.B. 3031 Sapon Post Office, Abeokuta, Ogun State, Nigeria.
E-mail – lekanawonuga@yahoo.com

ABSTRACT

Background: Anaemia during pregnancy is a global public health issue that may be associated with adverse pregnancy outcomes. Ante natal care should be concerned with early detection and management of all degrees of anaemia in pregnancy.

Objectives: To determine the prevalence of anaemia and associated pregnancy outcomes among expectant mothers attending ante natal clinic at the University College Hospital, Ibadan.

Subjects, Methods and Materials:

A descriptive, longitudinal study of the maternal and perinatal outcomes of anaemia among an obstetric population at the University College Hospital, Ibadan.

Results: Prevalence of anaemia in pregnancy was 6.5% with mild and moderate anaemia accounting for 4.6% and 2.2% respectively. Mild to moderate anaemia were not associated with adverse maternal and perinatal outcomes

Conclusion: Prevalence of anaemia in our environment appears to be falling. Adverse maternal and perinatal outcome are unlikely with mild to moderate levels of anaemia.

Keywords: Anaemia in pregnancy, prevalence, maternal outcome, perinatal outcome.

INTRODUCTION:

Anaemia associated with pregnancy is a public health problem all over the world[1]. In most published studies, the mean minimum normal haemoglobin in healthy pregnant women living at

Correspondence
David O **AWONUGA**
Department of Obstetrics and Gynaecology, Federal Medical Centre, Abeokuta. P.M.B. 3031 Sapon Post Office, Abeokuta, Ogun State, Nigeria.
E-mail – lekanawonuga@yahoo.com

sea level is between 11 and 12g/dl[2]. According to the World Health Organisation (WHO), a level of haemoglobin below 11g/dl during pregnancy is an indication of anaemia[3]. A well conducted longitudinal study of the hydraemia of pregnancy in iron replete, healthy pregnant women recorded 10.4g/dl as the lowest value[4]. In practice however, a lower haemoglobin level of 10g/dl or less has been shown to be more appropriate in indicating anemia in sub-Saharan Africa[5]. This level has been justified on the basis of the work of Lawson and Harrison which showed that serious harm to the fetus did not occur until the haemoglobin value was below 10g/dl or packed cell volume of 30% or less [6].

Each year, more than 600,000 women die from pregnancy related causes, the vast majority (99%) in developing countries[7]. Maternal mortality in developing countries worldwide is about 400/100,000 live births and anaemia is primarily responsible for 2 – 12 % of these [8]. Anaemia has been said to be responsible for 16% of maternal deaths in India, 11% in Kenya, 9% in Nigeria and 8% in Malawi[7]. Estimates of maternal mortality from anaemia range from 34 per 100,000 live births in Nigeria to as high as 194 per 100,000 livebirths in Pakistan [9,10]. In combination with obstetric haemorrhage, anaemia is estimated to be responsible for 17% to 46% of cases of maternal deaths [11,12,13].

Increased risks of premature labour and low birth weight have been reported in association with anaemia in pregnancy[2,14-16]. Merchant and Agarwal reported that maternal anaemia resulted in 12% to 28% of foetal loss, 30% of perinatal deaths, 7 to 10% of neonatal deaths and 50% chance of delivering a low birth weight baby[1]. Both prematurity and low birth weight are common problems in developing countries and contribute significantly to perinatal mortality. Poverty, poor antenatal clinic attendance and recurrent infections are compounding factors that can in themselves result in anaemia, low birth weight and prematurity [2]. Other possible complications that have been reported to be associated with anaemia in pregnancy include bacterial infections, sepsis and pre-eclampsia. Increased risk of spontaneous abortion, abruptio placentae and neural tube defect has also been documented especially in folate deficiency anaemia[17].

Anaemia is the commonest medical disorder to occur in pregnancy[18]. The WHO report gives the anaemia prevalence picture at global level as 55.9% among expectant mothers[1,19]. Published prevalence rates for developing countries range from 35% to 56% for Africa, 37% to 75% for Asia and 37% to 52% for Latin America[19]. In industrialized countries, the prevalence is less than 20%. It is significantly higher in the 3rd trimester than in the first and second trimesters of pregnancy[1]. Antenatal care should be concerned with early detection and management of all degrees of anaemia in pregnancy and it deserves more attention than it is currently receiving. It is against this background that during the African Regional Consultation on the Control of Anaemia in Pregnancy in Brazzavile, Congo, it was recommended that simple studies of prevalence and etiology be undertaken for each region of Africa[15]. This was the justification for this study, which has the following objectives.

1. To determine the prevalence of anaemia among expectant mothers attending antenatal clinic at the University College Hospital
2. To determine the pregnancy outcome among these patients.

MATERIALS AND METHODS

This is a descriptive longitudinal study. In this study, the obstetric performance of 70 anaemic women who booked for antenatal care and confinement at the University College Hospital Ibadan, between 1st of January and 31st of October 2002 was studied. It involved pregnant women who were found to be anaemic in the second half of their pregnancies during this period. The participants were recruited into the study at booking (those that booked in the 2nd half of pregnancy) or at any time during the ante natal visit when found to be anaemic in the 2nd half of pregnancy. They were subsequently followed up till delivery. Majority of them booked for antenatal care in the second half of pregnancy.

At booking, and during each subsequent ante natal visit till term or delivery, blood for packed cell estimation was taken by finger prick into a heparinized capillary tube, centrifuged and the result read on a haematocrit reader. A packed cell volume less then 30% was taken as indicating anaemia in pregnancy. The average packed cell volume (Mean PCV) was also estimated in patients who had at least 2 antenatal visits after booking. This was used as a measure of anaemia in the second half of pregnancy. Patients who had obvious cause of anaemia with known pregnancy outcome such as multiple pregnancy, sickle cell disease, early pregnancy

bleeding or antepartum haemorrhage were excluded from the study.

All the women were given a supply of iron tablets (ferrous suphate 200mg thrice daily), folic acid 5mg daily and pyrimethamine 25mg weekly according to the hospital policy. They were also seen more frequently than other women who were not anaemic. Further investigations to elucidate the cause of the anaemia in these patients such as blood film for malaria parasites, full blood counts, urine microscopy, culture and sensitivity and stool ova and parasites were done. Appropriate treatments were subsequently instituted.

Data were collected on maternal age, parity, educational level, blood genotype and gestational age at booking. Maternal outcome measures included antenatal and intrapartum complications and mode of delivery while perinatal outcome measures were gestational age at delivery, birth weight, Apgar scores of the babies at birth and fetal complications.

Anaemia in pregnancy in our environment is classified into 3 categories for treatment and to predict outcome (3,5) viz: Mild: PCV = 27 – 29%, Moderate: PCV = 19-26%, Severe: PCV $\leq$ 18%. This classification was used for the purpose of this study. Gestational age was estimated from the women's last menstrual period or early ultrasonography where necessary. . Low birth weight was defined as birth weight < 2,500gm and preterm as gestational age below 37 completed weeks.

The data generated were coded and subsequently entered into the computer and frequencies and correlations generated. Statistical analysis was performed with Chi-square test, Fishers exact test, Student T- test and ANOVA test where applicable using Statistical Package for Social Scientists (SPSS) version 11. Level of significance was set at < 0.05.

Ethical Consideration:

Ethical approval was not sought for prior to study because institutional ethical review board was not yet constituted.

However, it was ensured that the study conformed to the established standard for ethical quality review. The patients were adequately informed about the study, their informed consent obtained before they were recruited into the study.

RESULTS

During this period of the study, a total of 1,027 patients booked for and were attending antenatal clinic at the University College Hospital, Ibadan. Out of these patients, 70 were found to have anaemia in 2nd half of pregnancy and were enrolled for the study. Of the 70 anaemic patients enrolled, 48 had at least 2 ante natal visits and had their obstetric performance during pregnancy evaluated. However, only 40 of the patients (57.1%) presented for delivery at this centre. This was mainly due to patients' relocation and industrial actions by hospital's personnel.

The prevalence of anaemia at booking during this study was 6.8% with 47 (4.6%) and 23 (2.2%) having mild and moderate anaemia respectively. There were no patients with severe anaemia at booking. However, 116 (11.3%) of the patients were found to be anaemic using W.H.O. standard (PCV <33% or haemoglobin <11gm/dl). During the study period, 19 of the 48 patients (39.6%) who had at least 2 antenatal visits after booking and had their packed cell volume estimated during the visits remained anaemic as judged from the mean of their haematocrit values. The remaining 29 patients (60.4%) had a rise in their packed cell volume values during this period and were no more anaemic.

At delivery, only 6 (15%) of the patients who were anaemic at booking and who presented for delivery in this centre remained anaemic.

Socio-Demographic Characteristics

The mean maternal age at booking among these patients was 30.09 4.33 years with a range of 20 – 42 years. The parity of the participants ranged from 0 – 4 with para 0 being the modal parity.

Most of the patients in this study were fairly well educated with 68.6% attaining tertiary level of education and 28.6% attaining secondary level only. There was only 1 patient with no formal education.

The gestational age at booking ranged between 14 and 37 weeks with a mean of 24.31 5.15 weeks.

Analysis of the maternal age at booking, parity, educational status and gestational age at booking showed that these socio-demographic parameters did not significantly affect the degree of anaemia at booking. (Table 1)

Pregnancy Complications (Figure 1)

Five of the 48 patients (10.4%) who were followed up at the antenatal clinic in this study had pregnancy complications. These complications occurred among patients that had tertiary level of

education and with mean haematocrit level of 30% or above during pregnancy. Of these five, two pregnancies were complicated by preterm premature rupture of membranes and they subsequently had preterm labour and delivery. Fetal distress diagnosed by the presence of fetal bradycardia and fresh meconium stained liquor, and abruptio placentae were seen in one patient each respectively. Pregnancy induced hypertension, the only maternal complication seen among the study participants was also diagnosed in one patient. Other possible maternal complications of anaemia of pregnancy such as bacterial infections and cardiac failure were not seen among these patients. There were also no cases with spontaneous miscarriage, intrauterine growth restriction or congenital abnormalities in this study. Analysis of these pregnancy complications revealed that their occurrence was not significantly influenced by maternal mean haematocrit in pregnancy or degree of anaemia (Table 2).

Mode of Delivery and Gestational Age at Delivery (Table 3)

Spontaneous vaginal delivery was achieved by 32 (80%) of the patients while 3(7.5%) and 5 (12.5%) patients had elective and emergency caesarean sections respectively. The total caesarean delivery rate was 20%. There was no case of assisted vaginal birth. The indications for the caesarean sections in this study were mainly obstetric in nature. Further analysis of the mode of delivery in relation to the haematocrit levels at term or at delivery revealed no statistically significant association. (Table 3). The gestational ages at delivery ranged between 33 weeks and 41 weeks with a mean gestational age of 38 1.72 weeks. Most of the patients (92.5%) delivered at term. Incidence of preterm delivery in this study was 7.5%. No patient delivered after term. However, there was no significant association between gestational age at delivery and the degree of anaemia during pregnancy.

Perinatal Outcome (Table 4).

Thirty nine patients (97.5%) had live births. Fresh stillbirth occurred in only one patient who was mildly anaemic at booking but had normal mean haematocrit during antenatal period. She presented at term with abruptio placentae and eventually delivered a fresh stillborn. There was no immediate or early neonatal death in this study. The perinatal mortality rate from this study was 25 per 1000 births. Degree of anaemia among the patients in this study did not significantly affect fetal outcome (Table 4).

Also, the mean Apgar score at 1 minute was 8.00 1.54 while the mean score at 5 minutes was 9.75 1.58. There was no significant influence of the degree of anaemia on Apgar scores at birth (Table 4). Table 4 also shows that most patients (90%) in this study had average sized babies with low birth weight babies accounting for 5%. The mean birth weights of babies delivered by patients in this study was 3.12 0.48kg with a range of 2.00kg to 4.20kg. There was no statistically significant difference in the birth weights of babies delivered by women with normal, mildly or moderately low mean packed cell volume during pregnancy.

Maternal Peripartum Complications

Two of the patients (5%) who presented for delivery developed primary post partum haemorrhage. No other maternal peripartum complication was recorded in this study.

Table 1: Socio-demographic characteristics of patients and degree of anaemia at booking

CHARACTERISTICS	DEGREE OF ANAEMIA		TOTAL	SIGNIFICANCE
	MILD n=47	MODERATE n=23	N=70	
Mean Age at Booking	29.87 ±4.62	30.52 ±3.72	30.09 ±4.33	P =0.559 (NS)*
Parity				
0	19 (40.4%)	12 (52.2%)	31 (44.3%)	P = 0.700(NS)**
1	11(23.4%)	5 (21.7%)	16 (22.9%)	
2	10 (21.3%)	5 (21.7%)	15 (21.4%)	
3	2 (4.3%)	0 (0.0%)	2 (2.9%)	
4	5 (10.6%)	1 (4.3%)	6 (8.6%)	
Total	47 (100.0%)	23 (100.0%)	70 (100.0%)	
Educational Level				
None	1 (2.1%)	0 (0.0%)	1 (1.4%)	P = 0.754 (NS)**
Primary	1 (2.1%)	0 (0.0%)	1 (1.4%)	
Secondary	14 (29.8%)	6 (26.1%)	20 (28.6%)	
Tertiary	31 (66.0%)	17 (73.9%)	48 (68.6%)	
Total	47 (100.0%)	23 (100.0%)	70 (100.0%)	
Mean GA at booking	24.02 ±4.79	24.91 ±5.88	24.31 ±5.15	P = 0.500 (NS)*

N.B * = Student t-test ** = Chi-Square test GA = Gestational age

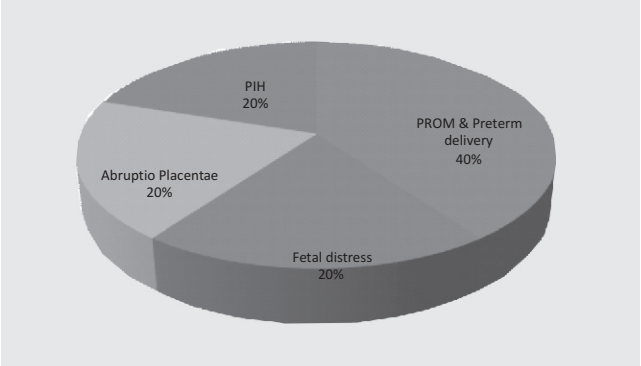

Figure 1: Pregnancy Complications

Table 2: Mean PCV in pregnancy and pregnancy complications

Mean PCV / Level of Anaemia	Pregnancy Complication			Significance*
	Yes	No	Total	
Normal	5	24	29	P = 0.161
Mild Anaemia	0	16	16	NS
Moderate Anaemia	0	3	3	
Total	**5**	**43**	**48**	

NB * = Chi square test NS = Not significant

Table 3: Type of and gestational age (GA) at delivery vs haematocrit level at term / delivery

	Haematocrit level at term or delivery (Degree of anaemia)				
Mode of delivery	_ _	27-29% (Mild)	19 – 26% (Moderate)	Total	Significance
SVD	27	1	4	32	P = 0.162
ELCS	2	1	0	3	(NS)*
EMCS	5	0	0	5	
Total	**34**	**2**	**4**	**40**	
G A (weeks)					
33-36	2 (7.7%)	1 (7.7%)	0 (0.0%)	3 (7.5%)	P = 0.959
37-41	24 (92.3%)	12 (92.3%)	1 (100.0%)	37 (92.5%)	(NS)*
Total	**26(100.0%)**	**13(100.0%)**	**1 (100.0%)**	**40(100.0%)**	
Mean GA	38.73±1.80	38.85±1.68	39.00	38.78±1.72	P=0.973
Range	33-41	35-41	39	33-41	(NS)**

NB

SVD – Spontaneous vaginal delivery
ELCS – Elective caesarean section
EMCS –Emergency caesarean section
* = Chi – Square test ** = ANOVA test

Table 4: Perinatal outcome and degree of anaemia during pregnancy

	MEAN PCV DURING PREGNANCY				
Perinatal Outcome	**Normal N=26**	**Mild Anaemia N=13**	**Moderate Anaemia N=1**	**Total N=40**	**Significance**
Fetal Outcome					
Live born	25 (96.2%)	13 (100.0%)	1 (100.0%)	39 (97.5%)	P = 0.759
Fresh Still born	1 (3.8%)	0 (0.0%)	0 (0.0%)	1 (2.5%)	(NS)*
Total	26 (100.0%)	13(100.0%	1 (100.05)	40 (100.0%)	
Mean APGAR Score at 1 minute	7.96±1.82	8.08±0.86	8.00	8.00±1.54	P= 0.977 (NS)**
Mean APGAR score at 5 minutes	9.62±1.96	10.00±0.00	10.00	9.75±1.58	P = 0.773 (NS)**
Birth W eight (kg)					
2.00-2.49	2 (7.7%)	0 (0.0%)	0 (0.0%)	2 (5.0%)	P=0.848
2.50-2.99	9 (34.6%)	5 (38.5%)	1 (6.7%)	15 (37.5%)	(NS)*
3.00-3.49	9(34.6%)	6 (46.2%)	0(0.0%)	15 (37.5%)	
3.50-3.99	4 (15.4%)	2 (15.4%)	0(0.0%)	6 (15.0%)	
≥4.00	2 (7.7%)	0 (0.0%)	0 (0.0%)	2 (5.0%)	
Total	26(100.0%)	13(100.0%)	1 (100.0%)	40(100.0%)	
Mean Birth Weight (kg)	3.15±0.51	3.09±0.44	2.85±0.00	3.12±0.48	P = 0.811 (NS)**
Range	2.00-4.20	2.5-3.90	2.85	2.00-4.20	

NB

* = Chi-Square test ** = ANOV A

DISCUSSION

Although there is a consensus of opinion on the adverse effects of anaemia during pregnancy[13,16,17], there have been conflicting evidence from studies as to the degree of anaemia associated with adverse pregnancy outcome[14,20,21]. While some studies have shown that a mid trimester fall in haemoglobin level to 100g/l may be optimal and that haemoglobin concentration as low as 95g/l seems remarkably harmless[21], others have reported a statistically significant increase in prematurity at all haematocrit levels of less than or equal to 38% (haemoglobin level of 127g/l)[20]. Notwithstanding, haemoglobin levels above 145g/L due to inadequate or failure of plasma volume expansion has been associated with increased risk of pregnancy complications such as pre-eclampsia, preterm delivery and low birth weight[21]. It has been reported by other workers that it is the severe anemia with haemoglobin less than 70g/L that is a major cause of maternal morbidity and mortality[22]. At present, it is not known what degree of anaemia is associated definitely with adverse pregnancy outcome[23]. This raises the question of whether the diagnosis of anaemia should be re-defined.

A precise definition of anaemia during pregnancy is compounded by various factors such as altitude, ethnicity, use of iron supplement and changes in plasma volume during pregnancy. Definitions of anaemia have ranged from haematocrit value of ≤33% to a haemoglobin level of <10gm per deciliter (corresponding to

haematocrit value of 30%), or the centre for disease control's month specific criteria or haematocrit value of less than the tenth percentile for ethnic groups and duration of pregnancy[15,24].

In this study, the prevalence of anaemia in pregnancy was 6.8% (using 10g/dl) and 11.3% when the WHO minimum criterion was used. These values were lower than the corresponding values of 15% and 51.4% respectively obtained by another study at this centre two years earlier [25]. The values were also much lower than the World Health Organization's prevalence of pregnancy anaemia of 50-60% in tropical Africa and also lower than the published figures elsewhere[22,26]. The values however compared relatively with the prevalence of 8.8% obtained in Enugu by Chukudebelu and Obi [27]. A recent study in South Africa found a prevalence of 15.7% [28]. The lower prevalence of anaemia in pregnancy obtained from this study may be due to increasing awareness of the health benefits of a balanced diet and the relative improvement in the socio-economic status of our patients. Among the 40 patients who were followed up in antenatal clinic and presented for delivery 15% remained anaemic. This may be due to the advantageous effect of haematinics coupled with anti-malarial prophylaxis [21]. Those who remained anaemic might have not been taking their drugs or the drugs might not be having the desired results.

In this study 44.3% of the patients were nulliparous while most (over 80%) booked in the second half of pregnancy. Also, over 60% of the patients in this study were well educated. Previous studies done elsewhere have identified primigravidity, inter-pregnancy interval of less than two years, late booking for antenatal care, twin pregnancy, low socio-economic status, wet season and malaria parasitaemia as risk factors for anaemia in pregnancy [23,29,30,31]. However, in this study, some of these factors studied did not significanty affect the prevalence and the degree of anaemia. The role played by malarial infestation in anaemia in pregnancy is well documented [32,33].

A previous study done at this centre found no significant difference in the mode of delivery and fetal outcome between anaemic and non-anaemic patients who had antenatal care and confinement at our centre [25]. Similar findings were also obtained in this study. Also in this present study, 20% of the patients were delivered by caesarean section. This value compares well with overall caesarean section rate of 15-21% in most West African countries [8].

The mean birth weight was 3.12kg 0.48 with low birth weight babies accounting for only 5% of total births. Also, the mean gestational age at delivery was 38.781.72 weeks. Preterm delivery rate was 7.5% in this study. Anaemia in pregnancy has been reported to be associated with significant increase in preterm births and up to 50% chance of delivering low birth weight babies [1,2,14,17]. In this study however, no significant difference was found in the birth weight of babies of women with normal and low haemoglobin level as well as their gestational ages at delivery. Similar findings were obtained in Lagos by Afolabi and Akinola where mild to moderate anaemia were not associated with low birth weight babies [34]. This may be due to the absence of severe anaemia in our patients.

The major factor determining birth weight is the incidence of preterm delivery and birth weight is the single biggest determinant of mortality in the first year of life and therefore has a strong claim to being a good indicator of the efficiency with which a woman has supported her fetus [21].

The mean Apgar scores in this study were 8.0 1.5 and 9.7 1.6 at 1 and 5 minutes respectively. There was no significant correlation between the degree of anaemia and Apgar scores at birth. There was one fresh stillborn with a perinatal mortality rate of 25 per 1000 births. These results were similar to that found in this centre in a previous study by other workers [25]. Two patients (5%) developed primary post partum haemorrhage. It is noteworthy that in this study, no maternal mortality was recorded.

As the participants in this study were either mildly or moderately anaemic, it is therefore possible as noted in previous studies, that it is the severe anaemia as opposed to low haemoglobin values especially in the second trimester of pregnancy that is associated with adverse consequences on fetal and maternal outcome [21, 22]. This would require further studies.

CONCLUSIONS AND RECOMMENDATIONS

The prevalence rate of anaemia in pregnancy at the University College Hospital (UCH), Ibadan from this study is 6.8%. Compared to an earlier study in this centre, the prevalence of anaemia among our obstetric population has reduced. Also, in this study, mild to moderate anaemia appear not to adversely affect pregnancy outcome.

Because of the small size of the study participants occasioned by constraint of time and

incessant industrial actions which hampered follow up of the patients till delivery, larger studies are needed to generalize the findings of this study. Also since low haematocrit level may result from inadequate red cell mass or a large plasma volume expansion and vice versa, and since rapid changes occur in red cell mass and plasma volume in pregnancy, interpretation of isolated heamatocrit values may be difficult. Further studies which define anaemia in pregnancy as a function of red cell mass and plasma volume are therefore necessary to resolve the issue[15].

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