

Haematological values in pregnancy in Ibadan, Nigeria

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Summary

Haematological values were studied in 495 apparently healthy pregnant Nigerian women receiving antenatal care in a maternity hospital in Ibadan, Nigeria. Means, standard deviations and ranges of haematocrit, total and differential white cell counts, absolute platelet count, erythrocyte sedimentation rate, prothrombin time (PT) and partial thromboplastin time (PTT) were determined. The mean haematocrit was 0.311 (SD 0.033), mean total leucocyte count was $5.765 \times 10^9/L$ (SD $1.753 \times 10^9/L$) and mean platelet count was $193 \times 10^9/L$ (SD $46 \times 10^9/L$). The mean erythrocyte sedimentation rate was 18.6 (SD 7.4) mm/hour, mean prothrombin time was 12.3 (SD 2.5) seconds and mean partial thromboplastin time was 38.4 (SD 2.0) seconds. There were significant differences between the second and third trimesters of pregnancy in any of the haematological values studied. The study has presented the range of variations in haematological values (including those that measure coagulation) in apparently healthy pregnant Nigerian women. It would appear that in the population studied, there were no significant differences in these haematological values between the second and third trimesters in otherwise healthy women receiving regular antenatal care.

Keywords: Normal values, Blood, Coagulation, Pregnancy, Nigeria.

Résumé

Les valeurs hématologiques ont été étudiées chez 495 femmes Nigériennes enceintes et apparemment en bonne santé. Les femmes recevaient toute des soins prénataux dans un hôpital de maternité à Ibadan au Nigeria. La moyenne, l'écart type et des variances des hématocrite, le compte absolu des plaquettes, le taux de sédimentation des érythrocytes, de temps des Prothrombine (PT) et le temps partielle des Prothrombines (PTTK) ont été déterminés. La valeur moyenne de l'hématocrite a été de 0.311 (SD 0.033), la moyenne du compte total des leucocytes a été de $5.765 \times 10^9/L$ (SD $1.753 \times 10^9/L$) et la moyenne du compte des plaquettes a été de $193 \times 10^9/L$ (SD $46 \times 10^9/L$). La moyenne du taux de sédimentation des érythrocytes a été de 18.6 (SD 7.4) mm/heure, la moyenne du temps de prothrombine a été de 12.3 (SD 2.5) secondes, et la moyenne du temps partiel de thromboplastine a été de 38.4 (SD 2.0) secondes. Il n'y a pas eu de différences significatives entre le second et le troisième trimestre de la grossesse dans aucune des valeurs hématologiques étudiées. L'étude a présenté une variation des paramètres hématologiques (incluant ceux

qui mesurent la coagulation) chez des femmes Nigériennes enceintes et apparemment en bonne santé. Il apparaît que dans la population étudiée, il n'y a pas eu de différence significative dans ces valeurs hématologiques entre le second et le troisième trimestre de la grossesse. Chez les femmes enceintes et en bonne santé recevant des soins prénataux réguliers.

Introduction

Pregnancy is associated with a wide variety of physiological changes affecting various systems, including the blood. Thus, pregnant women have been shown to have different values of various haematological parameters when compared with their non-pregnant counterparts [1-4]. Some authors have further claimed a racial component to the variation of haematological values that is observed in various parts of the world. For example, Essien *et al* [5] reported finding lower platelet counts in adult Nigerian than in Caucasians living in Nigeria. For these reasons, the study of haematological values in pregnancy and in various races remains fascinating.

A practical, clinical reason for the study of haematological changes in pregnancy lies in defining the range of normal variation observed in otherwise healthy women. This is important because it aids in the interpretation of test result in pregnancy. In such situations, comparisons with normal values derived from non-pregnant subjects are not useful since it has already become known that haematological values in pregnancy differ from those in the non-pregnant state. Thus, it is useful to define the range of normal variation of haematological values in a group of healthy women in order to have reference figures for use in pregnancy and to aid interpretation of individual test results in pregnancy.

This study was designed to present the range of variation in haematological values in apparently healthy pregnant Nigerian women attending a large maternity hospital in Ibadan, Nigeria.

Subjects and methods

The study was carried out at Adeoyo Maternity Hospital, Ibadan. The hospital provides antenatal, delivery and postnatal services. It is mostly used by women belonging to the lower socio-economic classes. The subjects were recruited by a systematic random sampling procedure from among pregnant women attending the antenatal clinics of the hospital. Women who met the following criteria were recruited into the study:

- (i) no history of chronic illness such as diabetes mellitus or hypertension,
- (ii) no history of sickle cell anaemia or any other haematological disorder.

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(iii) no acute illness on the day she was being seen or in the previous week.

A questionnaire was administered to each subject. The questionnaire included identification information, age, date of last menstrual period and any complaints or illness. Gestational age was calculated from the first day of the last menstrual period. Five millilitres of blood were then drawn under aseptic conditions and aliquoted into tubes for the various tests. For all subjects, the haematocrit, total and differential white cell counts, absolute platelet count and erythrocyte sedimentation rate were determined by standard laboratory techniques using manual methods [6] since electronic methods were unavailable. Prothrombin time and partial thromboplastin time (kaolin) were determined in a 25% sub-sample of subjects for reasons of costing using standard haematological techniques [6].

The data are presented as means, standard deviations and ranges in SI units. Comparisons between values for the second and the third trimesters were made using Student's *t*-test. A probability value of *P* of < 0.05 was considered significant.

Results

A total number of 495 women were studied. Their ages ranged from 14 to 40 years with a mean (SD) of 26.8 (5.5) years. Peak age range was 21-30 years, which 63.7% of the subjects fell into. About 95% were married and 25.3% were primigravidae. Majority (93.5%) were Yoruba and two-thirds (68.3%) were Muslims (Table 1). Only 2 (0.4%) women were seen in the first trimester, 92 (18.6%) were seen in the second trimester and 303 (61.2%) were seen in the third trimester. About one-fifth (98/495 or 19.8%) did not remember the dates of their last menstrual periods. Most of the subjects (70.1%) were petty traders and nearly all the others were in such occupations as hair dressing and sewing.

Table 1: Characteristic of the women studied

	No	%
Age (years)		
< 20	63	12.7
21 - 30	315	63.7
31 - 40	115	23.2
Exact age unknown	2	0.4
Marital Status		
Married	472	95.4
Single	23	4.6
Parity		
Multigravida	370	74.7
Primigravida	125	25.3
Ethnic group		
Yoruba	463	93.5
Hausa	27	5.5
Others	5	1.0
Religion		
Islam	338	68.3
Christianity	157	31.7

Table 2 shows the means, standard deviations and ranges of the parameters studied. Mean haematocrit was 0.311 with a range of 0.23 - 0.44. Mean white cell count was $5.765 \times 10^9/L$ (SD $1.753 \times 10^9/L$) and the mean platelet count was $193 \times 10^9/L$ (SD $46 \times 10^9/L$). The mean (SD) of prothrombin time and of partial thromboplastin time were 12.3 (2.5) seconds and 38.4 (2.0) seconds, respectively (Table 2).

Mean erythrocyte sedimentation rate was 18.6 (SD 7.4) mm in the first hour. The distribution of haematocrits is shown in Table 3. Nearly two-thirds (61.6%) had haematocrits lower than 0.33 and 27.9% had haematocrits lower than 0.30. Only 7.9% had haematocrits greater than 0.35.

Table 2: Values for haematological parameters studied

Parameter	Mean	SD	Range
Haematocrit (L/L)	0.311	0.033	0.23 - 0.44
Total white cell count ($\times 10^9/L$)	5.765	1.753	3.000 - 12.600
Differential white cell count			
Neutrophils (%)	60.9	5.8	32.0 - 84.0
Lymphocytes (%)	37.7	5.7	5.0 - 66.0
Eosinophils (%)	1.1	1.0	0.0 - 4.0
Monocytes (%)	0.4	0.7	0.0 - 4.0
Basophils (%)	0.0	0.0	0.0
Platelet count ($\times 10^9/L$)	193	46	103 - 382
ESR (mm in first hour)	18.6	7.4	5.0 - 43.0
Prothrombin time (s)	12.3	2.5	9.0 - 22.0
Partial thromboplastin time (s)	38.4	2.0	33.0 - 43.0

ESR = Erythrocyte sedimentation rate

Table 3: Distribution of haematocrit values among 495 pregnant Nigerian women

Haematocrit	No	%
0.23 - 0.26	49	9.9
0.27 - 0.29	89	18.0
0.30 - 0.32	167	33.7
0.33 - 0.35	151	30.5
0.36 - 0.38	35	7.1
≥ 0.39	4	0.8

Table 4 shows the comparisons of the mean values of the haematological parameters between women in the second and those in the third trimester. There was no significance difference between the two trimesters in any of the studied parameters.

Table 4: Comparison of haematological values between second and third trimesters

Parameter	Trimester		t	p
	Second	Third		
Haematocrit (L/L)	0.313 (0.031)	0.311 (0.032)	0.473	0.642
Total white cell count ($\times 10^9/L$)	5.513 (1.623)	5.803 (1.767)	1.162	0.244
Platelet count ($\times 10^9/L$)	186 (45)	195 (47)	1.612	0.104
ESR (mm in first hour)	17.8 (6.8)	18.9 (7.8)	1.253	0.208
Prothrombin time (s)	12.5 (12.3)	12.3 (2.6)	0.240	0.806
Partial thrombo-plastin time (s)	38.6 (1.7)	38.9 (2.0)	0.564	0.581

Discussion

This study has described the range of variation in commonly measurable haematological parameters in apparently healthy pregnant Nigerian women in Ibadan. The study has, unlike other studies, measured all the commonly requested haematological tests including those of coagulation. The sample size is also larger than that in some other local studies. This study's primary objective is to study normal variation in pregnant women rather than test for differences in haematological values between pregnant and nonpregnant women, which are already well documented [1-4]. Therefore, non pregnant controls were not included in the study which allowed for a larger sample of the target group to be studied with added precision.

This study complements and extends the observations of Onwukeme and Nguru [7] who studied the normal range of haematological values in pregnancy. However, their study had a smaller sample size and covered only full blood count without studying the clothing profile and erythrocyte sedimentation rate we have. Our values for the haematocrit and white cell count were lower than those obtained by these workers in another part of the country. These differences could be due to altitude as the other study was done in Jos Plateau. The platelet count is similar to that obtained by other workers [7,8].

Using the World Health Organization's definition of anaemia for pregnant women (a haemoglobin of 110 g/l or a haematocrit < 0.33), over 60% of the women in this study would be considered anaemic. Therefore, it would appear that even in "apparently healthy" pregnant women, anaemia remains a major problem. Unfortunately, we did not set out to study the causes of the anaemia observed and no conclusions can be made about the aetiology of anaemia in pregnancy in our environment.

There were no significant differences between the second and the third trimesters with respect to any of the haematological parameters studied. Famodu *et al* [8] reported similar findings with respect to haematocrit and platelet counts when one considers their findings with regard to these two trimesters. However, Onwukeme and Nguru [7] reported some differences especially with the total white cell count and the neutrophil count. The reason for these differences are unclear.

This study has some limitations. Firstly, the patients studied were selected from a clinic; thus, the

findings can only be applicable to such clinic populations and not to those who do not attend such clinics for antenatal care. Secondly, the lack of results for the first trimester is an obvious limitation. However, this was due to the fact that most women in the locality receive antenatal care only in the second or third trimesters. Therefore, this study was only reflecting this phenomenon. Thirdly, the subjects were not screened for malaria, which might have aided in interpreting the haematocrit values obtained. Despite these limitations, however, the study probably provides an accurate picture of the range of haematological values to expect among apparently healthy pregnant women attending an antenatal clinic in the setting in which the study was carried out.

In summary, we have reported a study of the range of variation in haematological values in healthy pregnant Nigerian women. We hope that the figures will find application in routine clinical use locally.

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