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Original Research Article

Prevalence of anaemia in pregnancy at antenatal care booking in a teaching hospital in southern Nigeria

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ABSTRACT

Background: Anaemia in pregnancy is the commonest haematological condition seen in pregnant women in most developing countries. It is a global public health problem causing maternal and fetal morbidity and mortality. Objective was to determine the prevalence of anaemia and associated socio-demographic factors among pregnant women at booking at Rivers State University Teaching Hospital (RSUTH).

Methods: A retrospective study conducted from 1st January, 2015 to 31st December, 2020 at the antenatal clinic (ANC) of RSUTH. The laboratory records of 9990 pregnant women who booked for antenatal care were retrieved and reviewed. This included the socio-demographic characteristics and routine investigations. Data was extracted, coded and analyzed using the IBM statistical package for social sciences (SPSS) version 23.0 (Armonk, NY). P value <0.05 was considered statistically significant.

Results: Total number of women who booked for antenatal care was 9990 women. Of this, 8635 women were anaemic giving a prevalence rate of 86.4%. Mild anaemia was seen in 7061 (70.68%); 1546 (15.48%) had moderate anaemia and 28 (0.28%) had severe anaemia. Of 8635 (86.4%) women who were anaemic, 1647 (19.07%), 5036 (58.32%) and 1952 (22.61%) were seen in the first, second and third trimesters respectively. Mean and modal packed cell volume (PCV) were $29 \pm 3.1\%$ and 29% respectively. The range of PCV was 18-42%. Mean age was 31 ± 4.7 years and age range was 15-48 years. Modal parity was zero. Nulliparous and multiparous women accounted for 3586 (35.9%) and 3751 (37.5%) of the women respectively. There was a significant correlation between anaemia and age, parity, level of education, occupation and genotype at booking.

Conclusions: The prevalence of anaemia was unacceptably high. There is need for education on anaemia at the antenatal clinics and close monitoring of the interventional measures put in place to prevent anaemia in pregnancy, in order to improve the pregnancy outcome.

Keywords: Anaemia, PCV, Pregnancy, Antenatal care, Booking, RSUTH

INTRODUCTION

Anaemia in pregnancy is low blood haemoglobin concentration below 11 g/dl or haematocrit level less than 33%. It is a global health problem causing maternal and fetal morbidities and mortalities especially in developing countries.¹⁻⁶ In 2011, 38% of pregnant women aged 15-49

years were anaemic worldwide and the prevalence is highest in south Asia, Central and West Africa.¹ This is as a result of poor diet and intake of vitamins, iron and folic acid during pregnancy.¹⁻⁶ Other causes are haemorrhages, infections, worm infestation and haemoglobinopathies. Anaemia is the commonest complication seen in pregnancy affecting half of pregnant women worldwide.⁷⁻

⁹ This results from normal physiological changes that occur in pregnancy. The commonest type of anaemia is iron deficiency accounting for 50% of anaemia in women worldwide.^{1,3,10} Predisposing factors of anaemia in pregnancy are young age, grandmultiparity, low socio-economic status, illiteracy, ignorance and short inter-pregnancy interval.⁴ Depending on the type and severity of anaemia, the pregnancy may end up in miscarriages, prematurity, intrauterine growth restriction (IUGR), intrauterine fetal death, stillbirth, low birth weight and perinatal mortality.^{1-6,11}

World Health Organization (WHO) recommends daily iron and folic acid supplements for pregnant women and they are expected to check their haemoglobin concentration or packed cell volume every trimester if everything is normal.³

Correction of anaemia in pregnancy can either be with haematinics or blood transfusion. Information on the prevalence of anaemia and its risk factors in the hospital would go a long way to create awareness of this clinical condition. This will also reduce the adverse effects to the mother and baby. Hence this study aims at determining the prevalence of anaemia among pregnant mothers at antenatal booking at the RSUTH. The result will give an insight into the burden of anaemia in pregnancy in our environment.

METHODS

This is a retrospective study involving pregnant women, who booked for antenatal care at RSUTH from 1st January 2015 to 31st December, 2020. The hospital is a tertiary institution located in the southern part of Nigeria and serves as a major referral centre for all the primary and secondary centres and privately owned hospitals in and around the State. Rivers State has a population of more than 5 million. The antenatal clinic is run by obstetrics and gynaecology department of RSUTH. The average daily attendance to the antenatal clinic (ANC) is 70 women. The main religion in southern Nigeria is Christianity.

The data was obtained from laboratory registers where records of investigations done at booking in ANC were kept within the study period. Data obtained were socio-demographic characteristics and packed cell volume (PCV)/haemoglobin concentration (Hb conc) of all the women that registered for antenatal care. Blood (5 ml) was collected from each patient into a tube containing an anticoagulant, ethylenediaminetetraacetic acid (EDTA). A full blood count was performed on each sample. The data was analyzed using the IBM statistical package for social sciences (SPSS) version 23.0 (Armonk, NY). A pregnant woman was considered anaemic if Hb was <11 g/dl or PCV was <33%.¹² Mild anaemia was 9-10.9 g/dl, moderate anaemia was 7.0-8.9 g/dl and severe anaemia was <7 g/dl. Comparative analysis was done with Chi square test and p value <0.05 was considered statistically significant.

RESULTS

There were 9990 women who registered for antenatal care during the study period. There were 1925 (19.3%), 5822 (58.3%) and 2243 (22.4%) women in the first, second and third trimesters respectively. The yearly distribution of the women is shown in Figure 1. A total of 2030 (20.3%), 2323 (23.3%), 1369 (13.7%), 1879 (18.8%), 1761 (17.6%) and 628 (6.3%) women booked for antenatal care in 2015, 2016, 2017, 2018, 2019 and 2020 respectively. This is shown in Figure 2.

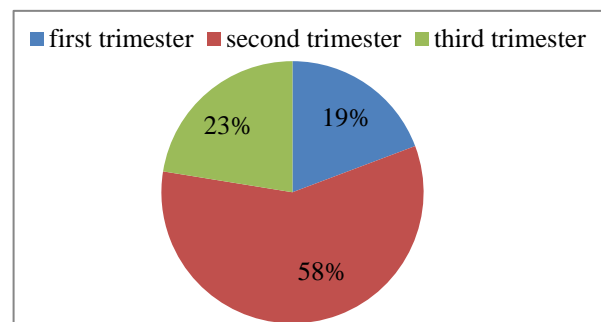


Figure 1: Number of antenatal women by trimester.

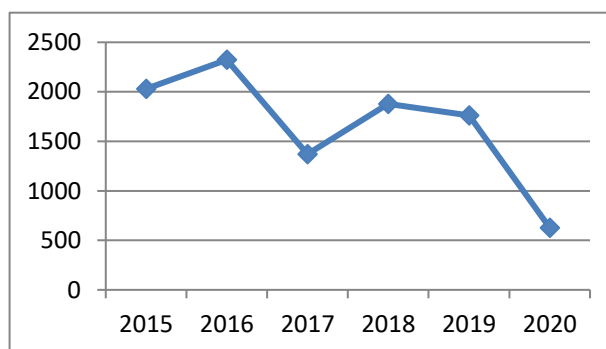


Figure 2: Yearly distribution of antenatal women.

A total of 9975 (99.2%) women had formal education while 15 (0.2%) had no formal education. Fifty eight (0.6%) women had primary education while 2871 (28.7%) and 7046 (70.5%) had secondary and tertiary levels of education respectively. Two hundred and thirty seven (2.4%) women were single while 9753 (97.6%) were married. Mean age±S.D was 31.4±4.7 years, age range was 15-48 years and most women, 6234 (62.4%) were in age group 30-39 years. Modal parity was para 0, parity range was 0-8 and most women, 3751 (37.5%) were multipara. Primigravida were 3586 (35.9%) and grandmultiparavida were 234 (2.3%). Mean gestational age (GA) was 20.5±7.5 weeks and most 5822 (58.3%) were in the second trimester (14-26 weeks). Most of the women, 3479 (34.8%) were civil servants. The socio-demographic characteristics of the women by trimesters are shown in Table 1.

A total of 8635 women had PCV less than 33% giving a prevalence rate of anaemia of 86.4%. This is shown in Figure 3. Of this 8635 anaemic women, mild anaemia was

found in 7061 (70.68%), moderate anaemia was found in 1546 (15.48%) and severe anaemia was seen in 28 (0.28%) women. This is shown in Figure 4. A total of 1647 (19.07%), 5036 (58.32%) and 1952 (22.61%) women were anaemic in the first, second and third trimesters respectively. This is shown in Table 2. Mean PCV during the study period was $29.3 \pm 3.2\%$. The range of PCV was 18-42%. Most women, 6219 (62.3%) had PCV of 25-29%.

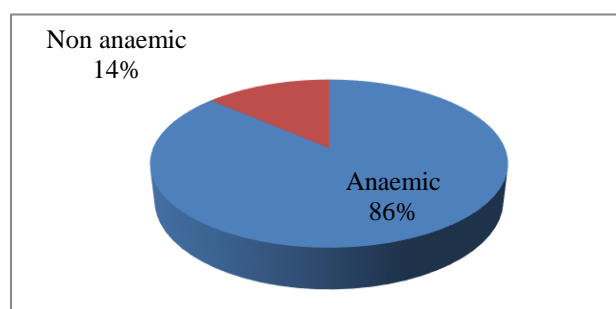


Figure 3: Prevalence of anaemia.

Table 3 shows comparison of anaemia with the socio-demographic factors in all the trimesters. Anaemia was

most prevalent in the 30-39 years age group (62.6%), followed by 20-29 years group (32.2) and ≥ 40 years group (4.4%). This was statistically significant. Most anaemia, 5036 (58.3%) occurred in the second trimester, followed by third 1952 (22%) and first 1647 (19.1%) trimesters. The difference was not significant. Anaemia occurred most in women with tertiary level of education, 6055 (70.1%). Anaemia was more prevalent in multigravida, 3433 (39.8%) and primigravida, 3150 (36.5%) compared to grandmultigravida, 208 (2.4%) and the difference was statistically significant. More civil servants 2980 (34.5%) and traders 2899 (33.6%) had anaemia than the rest of women with other occupation and the difference was statistically significant. Table 4 shows the prevalence of anaemia according to genotype and HIV status of the women. All women with SS, AC and SC genotype were anaemic. Also anaemia was more prevalent among those with AA, 6619 (76.65%) than those with AS genotype, 1971 (22.83%). The difference was also significant. Of those that had anaemia, 8118 (94.0%) were HIV negative while 517 (6.0%) were HIV positive. The difference was not significant. Therefore there was a statistically significant relationship between anaemia and age, parity, education, occupation and genotype.

Table 1: Socio-demographic characteristics of women in first, second and third trimesters.

Parameter	First trimester N=1925 (%)	2 nd trimester N=5822 (%)	3 rd trimester N=2243 (%)
Yearly breakdown			
2015	350 (18.2)	1179 (20.3)	501(22.3)
2016	401 (20.8)	1317 (22.6)	605(27.0)
2017	224 (11.6)	847 (14.6)	298 (13.3)
2018	369 (19.2)	1113 (19.1)	397 (17.7)
2019	441 (22.9)	998 (17.1)	322 (14.4)
2020	140 (7.3)	368 (6.3)	120 (5.3)
Gestational age			
Mean	≤ 13	14-26	> 26
Median	10.45	19.7	31.26
Mode	11	20.0	31
Range	11	21	29
Maximum	7	12	13
Minimum	13	26	40
Standard deviation	6	14	27
	2.23	3.58	3.03
Educational status			
No formal education	0 (0)	12 (0.2)	3 (0.1)
Primary	10 (0.5)	31 (0.5)	17 (0.8)
secondary	472 (24.5)	1718 (29.5)	681 (30.4)
Tertiary	1443 (75)	4061 (69.8)	1542 (68.7)
Occupation			
Civil servants	699 (36.3)	2137 (36.7)	643 (28.7)
Hair stylist	54 (2.8)	123 (2.1)	43 (1.9)
Housewife	291 (15.1)	1012 (17.3)	502 (22.4)
Lawyer	2 (0.1)	9 (0.2)	4 (0.2)
Make-up artist	5 (0.3)	9 (0.2)	16 (0.7)
Medical doctor	0 (0)	3 (0.1)	3 (0.1)
Seamstress	54 (2.8)	104 (1.8)	68 (3.0)
Students	142 (7.4)	397 (6.8)	151 (6.8)

Continued.

Parameter	First trimester N=1925 (%)	2 nd trimester N=5822 (%)	3 rd trimester N=2243 (%)
Teacher	38 (2)	139 (2.4)	37 (1.6)
Trader	640 (33.2)	1889 (32.4)	776 (34.6)
Marital status			
Married	1866 (96.9)	5701 (97.9)	2186 (97.5)
Single	59 (3.1)	121 (2.1)	57 (2.5)
Age			
Mean	31.09	31.59	31.36
Median	31	32.00	31
Mode	30	30	30
Range	32	33	30
Maximum	48	48	46
Minimum	16	15	16
Standard deviation	4.574	4.68	4.92
Age groups			
≤19	9 (0.5)	49 (0.8)	24(1.1)
20-29	701 (36.4)	1785 (30.7)	761(33.9)
30-39	1149 (59.7)	3725 (64.0)	1360 (60.6)
≥40	66 (3.4)	263 (4.5)	98 (4.4)
Parity			
Mean	1.06	1.39	1.44
Median	1.00	1.00	1
Mode	0	0	0
Range	8	8	8
Maximum	8	8	8
Minimum	0	0	0
Standard deviation	1.285	1.37	1.38
Parity groups			
0	909 (47.2)	1989 (34.2)	688 (30.7)
1	396 (20.6)	1426 (24.5)	597 (26.6)
2-4	585 (30.4)	2267 (38.9)	899 (40.1)
≥5	35 (1.8)	140 (2.4)	59 (2.6)

Table 2: Prevalence of anaemia by trimesters.

Trimester	Frequency	Percent (%)
First	1647	19.07
Second	5036	58.32
Third	1952	22.61

Table 3: Anaemia and socio-demographic characteristics in all trimester.

Parameter	Hb<11 (%)	Hb≥11 (%)	X ² (%)	P value
Age groups				
≤19	65 (0.8)	17 (1.3)	9.71	0.021
20-29	2778 (32.2)	469 (34.6)		
30-39	5410 (62.6)	824 (60.8)		
≥40	382 (4.4)	45 (3.3)		
Parity groups				
0	3150(36.5)	436 (32.2)	304.94	0.000
1	1844 (21.3)	575(42.4)		
2-4	3433 (39.8)	318 (23.5)		
≥5	208 (2.4)	26 (1.9)		
GA (trimester)				
≤13	1647 (19.1)	278 (20.5)	1.951	0.377

Continued.

Parameter	Hb<11 (%)	Hb≥11 (%)	X ² (%)	P value
14-26	5036 (58.3)	786 (58.0)		
>26	1952 (22.6)	291 (21.5)		
Marital status				
Married	8422 (97.5)	1331 (98.2)	2.446	0.118
Single	213 (2.5)	24 (1.8)		
Education status				
No formal edu	11 (0.1)	4 (0.3)	7.867	0.049
Primary	50 (0.6)	8 (0.6)	(Fisher exact test 8.102)	0.038
Secondary	2519 (29.2)	352 (26.0)		
Tertiary	6055 (70.1)	991(73.1)		
Occupation				
Civil servants	2980 (34.5)	499 (36.8)	23.289	0.006
Hair stylist	197 (2.3)	23 (1.7)		
Housewife	1538 (17.8)	267 (19.7)		
Lawyer	11 (0.1)	4 (0.3)		
Makeup artist	29 (0.3)	1 (0.1)		
Medical doctor	6 (0.1)	0 (0)		
Seamstress	200 (2.3)	26 (1.9)		
Students	602 (7)	88 (6.5)		
Teacher	173 (2)	41 (3)		
Trader	2899 (33.6)	406 (30)		

Table 4: Comparison of anaemia with genotype and HIV status.

Paarameters	Hb<11 (%)	Hb≥11 (%)	X ² (%)	P value
Genotype				
AA	6619 (76.65)	1160 (85.61)	57.55	0.000
AS	1971 (22.83)	195 (14.39)	(Fisher exact test 62.03)	
SS	37 (0.43)	0 (0.00)		
AC	3 (0.03)	0 (0.00)		
SC	5 (0.06)	0 (0.00)		
HIV status				
Negative	8118 (94.0)	1281 (94.5)	0.582	0.458
Positive	517 (6.0)	74 (5.5)		

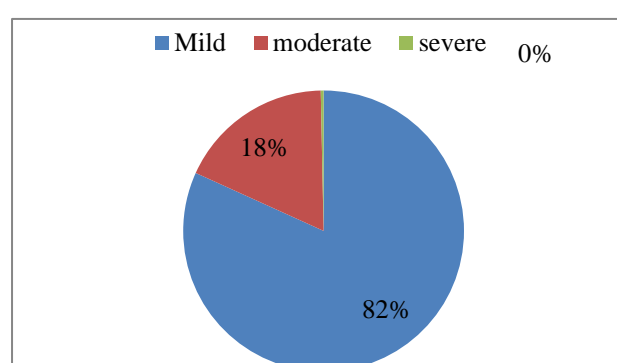


Figure 4: Grade of anaemia.

DISCUSSION

The prevalence of anaemia in this study is 86.4%. This is far too high and unacceptable knowing the implications of this level of anaemia in our pregnant mothers. This figure is higher than 56.8% observed in Eastern Ethiopia and

Somali respectively, 51.9% in Southern Ethiopia and 36% in East Africa.² In Northern and southern Ghana, the prevalence of anaemia among pregnant mothers was 70%, 50.8% and 57.1% respectively.^{3,13,14} In Kiboga, Uganda and Derna, Libya the prevalence were 63.1% and 54.6% respectively.^{15,16} In south-south and eastern parts of Nigeria, prevalence rates of 69.6% and 58% were reported respectively.^{6,17} The differences in the prevalence of anaemia may be as a result of poor dietary intake, economic status, socio-cultural, religious, poor health seeking behaviour and preventive health practices.^{4,18} The pregnant women may not have had enough iron and folic acid from their diet or supplement use to support the pregnancies. There is an extra demand of iron during pregnancy for fetal growth and development and dietary sources alone is not enough to take care of this. A lot of pregnant women don't take their iron and folic acid supplements probably because of side effects of the elemental iron or not liking to take oral drugs.³ In a study done in 2009, anaemia prevalence increased with non-compliance with iron supplements as pregnancy

progressed and the non-compliant pregnant women were 6 times more likely to be anaemic compared to those compliant.¹⁹ Also infections like malaria, urinary tract infection (UTI), worm infestation, haemoglobin genotype, human immunodeficiency virus (HIV) infection and increase blood loss in bleeding increase the risk of anaemia.^{3,20}

The principle of anaemia prevention in our centre is to control malaria and administer haematinics supplementation. All the booked pregnant women are screened and treated for anaemia, they also receive daily routine haematinics in the form of iron and folic acid. Malaria prophylaxis is with intermittent preventive treatment (IPT) of asymptomatic women with sulphadoxime-pyrimethamine combination after quickening. Malaria is also diagnosed early and prompt treatment instituted. There is also health education on diet and other ways of preventing anaemia in pregnancy. Insecticide treated nets for the pregnant mothers are no longer available in the antenatal clinic. Our booked mothers are also not routinely dewormed. Over the six years of study, the antenatal booking number fluctuates between 628 in 2020 and 2323 women in 2016. The number dropped drastically in 2020 due to COVID-19 pandemic. Most women registered for antenatal care in the second trimester indicating that most of our women register late for antenatal care therefore worsening and increasing the prevalence of anaemia at booking in the hospital. The mean PCV of 29% throughout the three trimesters is anaemia by World Health Organization (WHO) standard. Majority of the women in this study had mild anaemia and only 0.25% had severe anaemia. This finding is similar to other findings unlike an earlier study in the same centre with majority of the women having moderate anaemia.^{4,6,21-23} Most women with mild anaemia can survive pregnancy and delivery without complications but those with moderate and severe anaemia are at risk of maternal and fetal morbidities and mortalities.⁶

The number of anaemic women increased with maternal age. This is similar to findings from other studies.^{4,24-26} Some studies reported anaemia to be more in primigravida because of the risk of severe malaria in this group of women.^{27,28} The result of a meta-analysis showed that primigravidae were 61% less likely to develop anaemia during pregnancy compared to multiparae because of the effect of repeated pregnancy in depleting the iron store of a pregnant woman.^{2,29} A study done in Malaysia found a higher proportion of anaemia among grandmultigravida.³⁰ However in this study, the number of multigravidae with anaemia is greater than the anaemic primigravidae. This is similar to other studies.³¹⁻³³ Anaemia in this study was significantly associated with parity, age, educational status, occupation and genotype. This is similar to an earlier study although anaemia in the earlier study was also significantly associated with gestational age.⁶ More civil servants and traders had anaemia than the rest of the occupation and the difference was statistically significant.

Some studies showed that anaemia was associated with low socio-economic and low educational status.^{6,31,34} In this study, surprisingly anaemia was more prevalent in women with high level of education possibly because this group of women make up the majority of the women in this study and they also registered late in the second trimester of pregnancy due to delay in health seeking behaviour seen in our women. Anaemia in this study, occurred least among women who booked for antenatal care in the first trimester and highest in the second trimester of pregnancy. This finding is similar to other studies.^{4,6,18,24} This may be due to the fact that our women register late in the second and third trimesters when the dilutional effect of pregnancy and increased fetal demand are maximal. Also any anaemia that was not treated in the first trimester is likely to worsen in the second and third trimesters of pregnancy.^{4,6}

As expected, all the sicklers in the study were anaemic. This was also the case in earlier study.⁶ Most (77%) of the women who were anaemic had genotype AA and this was statistically significant. Also most women in the study were HIV negative and 94% of these women were anaemic compared to 6% of the women who were HIV positive. This finding is different from an earlier study in the department where anaemia was more prevalent in women who were HIV positive.⁶

CONCLUSION

The unacceptably high prevalence of anaemia from this study is an indeed a public health problem and needs urgent attention to prevent maternal and fetal morbidities and mortalities. Extra measures should be put in place to make sure that our women take their routine antenatal drugs; long lasting insecticide treated nets should be given to our antenatal mothers during booking. Majority of the booking were in the second trimester therefore our women should be encouraged and educated on the usefulness and benefits of registering early for antenatal care. Also education on anaemia causes and consequences, the usefulness of diet and dietary supplements in pregnancy should be emphasized to prevent anaemia in pregnancy.

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