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Original Article

Prevalence of Anaemia in Pregnant Women at Booking in The University of Calabar Teaching Hospital (UCTH) Calabar, Nigeria

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Abstract

Anaemia in pregnancy affects nearly half of all pregnant women worldwide. World Health Organization (WHO) estimates the prevalence in developing countries to vary between 53.8% and 90%. It contributes significantly to maternal and perinatal morbidity and mortality. Periodic review is therefore necessary to determine the trend of this problem and the associated factors among pregnant women which might guide in its intervention and further study. **Objectives:** To determine the prevalence of anaemia and its associated factors in pregnant women at booking at the University of Calabar Teaching Hospital. **Subjects and Methods:** This was a prospective descriptive cross-sectional study conducted at antenatal booking clinic of UCTH using a semi–structured interviewer administered questionnaire from March to July 2019. All pregnant women at their first antenatal visit were recruited for the study. Packed cell volume was used to assess the level of anaemia according to WHO guidelines. **Results:** Subjects used for the study were 441. Anaemia was present in 237 of them, giving a prevalence rate of 53.7%. Mild anaemia was present in 42.9%, and 10.8% had moderate anaemia. Anaemia was more prevalent among those with lower level of education (95.3%; $p=0.04$); subjects with monthly salary of ₦100,000 or less (86.9%, $p<0.05$), those with genotype AA (55.8%, $p<0.05$) and non-users of haematinics (59.9%, $p<0.05$). **Conclusion:** The prevalence of anaemia at booking in our environment is still high. There is need for universal basic education for the girl child, women empowerment and pre-pregnancy care for all our women.

Keywords: Anaemia, Booking, UCTH.

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Introduction

Anaemia is a global health problem affecting both developed and developing countries[1,2]. Globally anaemia affects 1.62 billion people, of these, 56 million are in pregnant women[1,3]. World Health Organization estimates the prevalence in developing countries to vary between 53.8% and 90% and 8.3–23% in developed countries[2]. It is known to be a significant cause of maternal as well as perinatal morbidity and mortality with the greatest burden borne by Asia and Africa[2,4,5]. It is responsible for about 20% of maternal deaths in Africa and 11% in Nigeria[2,5]. The wide variations in the prevalence rates are because of differences in etiological factors, socio-demographic characteristics, lifestyles, and health seeking behaviour across different cultures[2].

Anaemia in pregnancy is defined by the World Health Organization (WHO) as a haemoglobin concentration of <11 g/dl in a pregnant woman with 10–10.9, 7–9.9, and <7 g/dl classified as mild, moderate, and

severe anaemia, respectively[3-11]. Some of the factors associated with maternal anaemia include early age at pregnancy, grandmultiparity, bleeding, lack of spacing between pregnancies, multiple pregnancies, nutritional deficiency, parasitic infestations such as malaria, and hookworm, low socioeconomic class as well as poor maternal education[1,5,8,11-14].

The deleterious effects of anaemia in pregnancy include increased risk of maternal and foetal morbidity and mortality, preterm delivery, and low birth weight. It also impacts negatively on the intelligence of the child with long term developmental and behavioural problems[9,14]. There is a 500-fold increased risk of maternal, perinatal, and infant mortality in pregnant women with severe anemia[9]. An anaemic pregnant woman succumbs easily to obstetric haemorrhage and puerperal infection[3,11]. Severe anaemia is an important contributor to maternal death through the development of heart failure, particularly around the time of delivery[5]. Most of these causes of anaemia in pregnancy are preventable[13]. Periodic review is therefore necessary to determine the magnitude of the problem and a good knowledge of the predisposing factors can be used to formulate strategies to attack this important public health problem thereby reducing maternal morbidity and mortality.

Materials And Methods

The study was a prospective descriptive cross-sectional study conducted among pregnant mothers during their first antenatal visit at the antenatal clinic in the University of Calabar Teaching Hospital, Calabar, Cross-River State, from March to July, 2019. Consenting pregnant women who met the inclusion criteria were enrolled for the study. The sample size was computed using the general formula for a single population proportion. It was calculated by considering 54.5% prevalence of anaemia among pregnant women from a study in Uyo, which is in the same geopolitical zone with Calabar. The estimate from this study was desired to be within 5 percent of the actual prevalence with 95 percent confidence level. Accordingly, the final sample size was 423 after accounting for non-response rate, however 441 subjects were recruited. A semi-structured interviewer administered questionnaire was used to obtain information on the women's biodata, pregnancy history, nutritional history, and drug history. Packed cell volume was obtained using haemoglobinometer. Using WHO criteria, anaemia was classified into mild, moderate, and severe anaemia corresponding to the values 30-32.9%, 21-29.9% and < 21% respectively. The packed cell volume is part of the routine investigation for women at booking. Analysis was done using inferential statistics using tables with frequency and percentages.

Results

A total of four hundred and forty-one (441) pregnant women attending antenatal clinic for the first time were included in this study. The mean PCV of subjects was 33.26% ± 3.2, with a range from 25% to 44%. Anaemia was present in two hundred and thirty-seven (237) subjects, giving a prevalence rate of 53.7%. Mild anaemia was present in 42.9% (189) and moderate anaemia in 10.8% (48) of subjects (Figure 1). There was no severe form of anaemia in pregnancy.

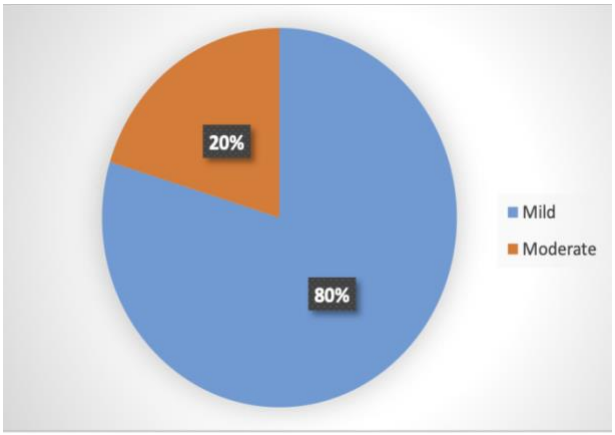

FIG. 1: Distribution of study participants based on severity of anaemia (n=237).

Table 2 shows the socio-demographic characteristics of subjects with anaemia (237). The mean age was 29.9 ± 5.1 years with a range from 18 to 45 years. Most subjects were within 21 to 30 years old (54.4%), married (95.8%), had tertiary level of education (59.9%), and had husbands with tertiary level of education, (68.3%). Most subjects were Self-employed (34.6%) and Civil servants (26.2%), while most of subjects' husbands were Civil servants (42.7%) and Self-employed (38.3%). Mean monthly salary was ₦ 77,380 ± 44,711, ranging from ₦ 6,000 to ₦ 300,000. Most subjects had monthly salary of ₦ 100,000 or less.

Table 3 shows the relationship between socio-demographic characteristics and anaemia at booking. The proportion of subjects with anaemia at booking was not significantly different comparing the various age groups, marital status, and occupation of subjects and their spouses (p>0.05, table 3). Higher proportion of subjects with anaemia was found among those with lower (primary or none) compared with higher

Table 1: Sociodemographic characteristics of subjects (N=441)

Variable	Frequency	Percent
Age groups (in years)		
≤20	17	3.8
21-30	224	50.8
31-40	193	43.8
>40	7	1.6
Total	441	100
Marital status		
Married	427	96.8
Single	14	3.2
Total	441	100
Educational level (subject)		
None	4	0.9
Primary	12	2.7
Secondary	135	30.6
Tertiary	290	65.8
Total	441	100
Educational level (husband)		
None	7	1.6
Primary	7	1.6
Secondary	103	24.2
Tertiary	310	72.6
Total	441	100
Occupation (subject)		
Civil servant	118	26.8
Self-employed	166	37.6
Trader	44	10.0
Housewife	22	5.0
Student	13	2.9
Unemployed	46	10.4
Others	32	7.3
Total	441	100
Occupation (husband)		
Civil servant	186	43.6
Self-employed	163	38.2
Trader	45	10.5
Farmer	2	0.5
Unemployed	3	0.7
Others	28	6.5
Total	441	100
Monthly salary (₦)		
≤100,000	354	80.3
101,000-200,000	75	17.0
>200,000	12	2.7
Total	441	100

Table 2: Sociodemographic characteristics of subjects with anaemia (n=237)

Variable	Frequency	Percent
Age groups (in years)		
≤20	9	3.8
21-30	129	54.4
31-40	94	39.7
>40	5	2.1
Total	237	100
Marital status		
Married	227	95.8
Single	10	4.2
Total	237	100
Educational level (subject)		
None	3	1.3
Primary	8	3.4
Secondary	84	35.4
Tertiary	142	59.9
Total	237	100
Educational level (husband)		
None	5	2.2
Primary	2	0.9
Secondary	65	28.6
Tertiary	155	68.3
Total	237	100
Occupation (subject)		
Civil servant	62	26.2
Self-employed	82	34.6
Trader	30	12.7
Housewife	10	4.2
Student	5	2.1
Unemployed	28	11.8
Others	20	8.4
Total	237	100
Occupation (husband)		
Civil servant	97	42.7
Self-employed	87	38.3
Trader	30	13.2
Farmer	2	0.9
Others	11	4.9
Total	237	100
Monthly salary (₦)		
≤100,000	206	86.9
101,000-200,000	26	11.0
>200,000	5	2.1
Total	237	100

(secondary or tertiary) level of education. Statistical significance was however found for subjects' level of education (p=0.04), while statistical significance was not found for husbands' level of education (p=0.05). Also, subjects with monthly salary of ₦100,000 or less had significantly higher prevalence of anaemia, compared with those with higher amount of salary (p<0.05).

Table 4 shows the obstetric characteristics of subjects with anaemia. Among subjects with anaemia (237), mean gestational age was 18.5 ± 6.8 weeks with a range from 5 to 38 weeks. Most subjects were within second trimester (63.7%), had singleton gestation (95.8%), and did not use family planning before index pregnancy (97.5%). Among those that used family planning before index pregnancy (6), implant (4, 66.6%) was the commonest means of contraception, while one subject each, used COC (1, 16.7%) and IUCD (1, 16.7%). Mean gravidity was 0.86 ± 1.1, ranging from 0 to 7, and approximately half (48.9%) were primigravid. Mean duration between last delivery and index pregnancy was 37.8 ± 34.2 months, ranging from 4 to 220 months. Common interpregnancy durations were 13 to 24 months (30.6%) and 25 to 36 months (21.5%). Thirty-eight anaemic subjects (31.4%) had interpregnancy duration within 18 months.

Table 5 shows relationship between obstetric factors and anaemia at booking. Compared with multiparous subjects, anaemia was proportionally commoner among those that were primigravid (58.9% vs. 49.6%), though

Table 3: Relationship between socio-demographic characteristics and anaemia at booking. (N=441)

Variable	Anemic n (%)	Normal n (%)	Total n (100%)	Chi-square (p-value)
Age groups (in years)				
≤20	9 (52.9)	8 (47.1)	17 (100)	Fisher's
21-30	129 (57.6)	95 (42.4)	224 (100)	Exact
31-40	94 (48.7)	99 (51.3)	193 (100)	(0.24)
>40	5 (71.4)	2 (28.6)	7 (100)	
Marital status				
Married	227 (53.2)	200 (46.8)	427 (100)	Fisher's
Single	10 (71.4)	4 (28.6)	14 (100)	(0.18)
Educational level (subject)				
None	3 (75.0)	1 (25.0)	4 (100)	Fisher's
Primary	8 (66.7)	4 (33.30	12 (100)	Exact
Secondary	84 (62.2)	51 (37.8)	135 (100)	(0.04)
Tertiary	142 (49.0)	148 (51.0)	290 (100)	
Educational level (husband)				
None	5 (71.4)	2 (28.6)	7 (100)	Fisher's
Primary	2 (28.6)	5 (71.4)	7 (100)	Exact
Secondary	65 (63.1)	38 (36.9)	103 (100)	(0.05)
Tertiary	155 (50.0)	155 (50.0)	310 (100)	
Occupation (subject)				
Civil servant	62 (52.5)	56 (47.5)	118 (100)	8.8
Self-employed	82 (49.4)	84 (50.6)	166 (100)	(0.19)
Trader	30 (68.2)	14 (31.8)	44 (100)	
Housewife	10 (45.5)	12 (54.5)	22 (100)	
Student	5 (38.5)	8 (61.5)	13 (100)	
Unemployed	28 (60.9)	18 (39.1)	46 (100)	
Others	20 (62.5)	12 (37.5)	32 (100)	
Occupation (husband)				
Civil servant	97 (52.2)	89 (47.8)	186 (100)	Fisher's
Self-employed	87 (53.4)	76 (46.6)	163 (100)	Exact
Trader	30 (66.7)	15 (33.3)	45 (100)	(0.06)
Farmer	2 (100)	0 (0.0)	2 (100)	
Unemployed	0 (0.0)	3 (100)	3 (100)	
Others	11 (39.3)	17 (60.7)	28 (100)	
Monthly salary (N)				
≤100,000	206 (58.2)	148 (41.8)	354 (100)	14.5
101,000-200,000	26 (34.7)	49 (65.3)	75 (100)	(0.01)
>200,000	5 (41.7)	7 (58.3)	12 (100)	

Table 4: Obstetric characteristics of subjects with anaemia (n=237)

Variable	Frequency	Percent
Booking Gestational age (in trimesters)		
First	59	24.9
Second	151	63.7
Third	27	11.4
Total	237	100
Gravidity		
Primigravida	116	48.9
Multigravida	121	51.1
Total	237	100
Family planning before pregnancy		
Yes	6	2.5
No	231	97.5
Total	237	100
Type of family planning		
Implant	4	66.7
Combined Oral Contraceptive pills	1	16.7
IUCD	1	16.7
Total	6	100
Inter-pregnancy duration (in months)		
0-12	16	13.2
13-24	37	30.6
25-36	26	21.5
37-48	16	13.2
49-60	9	7.4
≥60	17	14.0
Total	121	100
Inter-pregnancy duration (by 18 months)		
≤18 months	38	31.4
>18 months	83	68.6
Total	121	100
Number of gestation		
Singleton	227	95.8
Multiple	10	4.2
Total	237	100

Table 5: relationship between obstetric factors and anaemia at booking (N=441)

Variable	Anemic n (%)	Normal n (%)	Total n (100%)	Chi-square (p-value)
Gravidity				
Primigravid	116 (58.9)	81 (41.1)	197 (100)	3.8
Multigravid	121 (49.6)	123 (50.4)	244 (100)	(0.05)
Family planning before pregnancy				
Yes	6 (35.3)	11 (64.7)	17 (100)	2.4
No	231 (54.5)	193 (45.5)	424 (100)	(0.12)
Type of family planning				
Combined Oral Contraceptive	1 (20.0)	4 (80.0)	5 (100)	Fisher's
IUCD	1 (33.3)	2 (66.7)	2 (100)	Exact
Implant	4 (80.0)	1 (20.0)	5 (100)	(0.07)
Injectable	0 (0.0)	4 (100)	4 (100)	
Inter-pregnancy duration (in months)				
0-12	16 (53.3)	14 (46.7)	30 (100)	5.7
13-24	37 (48.7)	39 (51.3)	76 (100)	(0.33)
25-36	26 (56.5)	20 (43.5)	46 (100)	
37-48	16 (51.6)	15 (48.4)	31 (100)	
49-60	9 (64.3)	5 (35.7)	14 (100)	
≥60	17 (36.2)	30 (63.8)	47 (100)	
Inter-pregnancy duration (by 18 mths.)				
≤18 months	38 (52.7)	34 (47.3)	72 (100)	0.55
>18 months	83 (48.3)	89 (51.7)	172 (100)	(0.46)
Number of gestation				
Singleton	227 (53.0)	201 (47.0)	428 (100)	Fisher's
Twins	9 (81.8)	2 (18.2)	11 (100)	Exact
Triplets	1 (50.0)	1 (50.0)	2 (100)	(0.17)

Table 6: Other factors associated with anaemia amongst subjects with anaemia (n=237)

Variable	Frequency	Percent
Genotype		
AA	211	89.0
AS	26	11.0
Total	237	100
Comorbidity present		
None	231	97.5
Hypertension	2	0.8
PUD	4	1.7
Total	237	100
Vomiting present		
Yes	80	33.8
No	157	66.2
Total	237	100
Vomiting stopped		
Yes	73	91.3
No	7	8.7
Total	80	100
Fever present		
Yes	89	37.6
No	148	62.4
Total	237	100
Bleeding present		
Yes	19	8.0
No	218	92.0
Total	237	100
Deworming tablets taken		
Yes	16	6.8
No	221	93.2
Total	237	100
Hematinics taken		
Yes	41	17.3
No	196	82.7
Total	237	100
Lipton taken		
Yes	202	85.2
No	35	14.8
Total	237	100
Coffee taken		
Yes	12	5.1
No	225	94.9
Total	237	100
Local chalk taken		
Yes	189	79.7
No	48	20.3
Total	237	100

Table 7: Relationship between other factors and anaemia at booking (N=441)

Variable	Anemic n (%)	Normal n (%)	Total n (100%)	Chi-square (p-value)
Genotype				
AA	211 (55.8)	167 (44.2)	378 (100)	4.6
AS	26 (41.3)	37 (58.7)	63 (100)	(0.03)
Comorbidity present				
Yes	6 (33.3)	12 (66.7)	18 (100)	3.1
No	231 (54.6)	192 (45.4)	423 (100)	(0.08)
Vomiting present				
Yes	80 (50.0)	80 (50.0)	160 (100)	1.4
No	157 (55.9)	124 (44.1)	281 (100)	(0.23)
Fever present				
Yes	89 (57.4)	66 (42.6)	155 (100)	1.3
No	148 (51.7)	138 (48.3)	286 (100)	(0.25)
Bleeding present				
Yes	19 (59.4)	13 (40.6)	32 (100)	0.4
No	218 (53.3)	191 (46.7)	409 (100)	(0.51)
Deworming tablets taken				
Yes	16 (48.5)	17 (51.5)	33 (100)	0.4
No	221 (54.2)	187 (45.8)	408 (100)	(0.53)
Hematinics taken				
Yes	41 (36.0)	73 (64.0)	114 (100)	19.5
No	196 (59.9)	131 (40.1)	327 (100)	(0.00)
Lipton taken				
Yes	202 (53.2)	178 (46.8)	380 (100)	0.4
No	35 (57.4)	26 (42.6)	61 (100)	(0.54)
Coffee taken				
Yes	12 (60.0)	8 (40.0)	20 (100)	0.3
No	225 (53.4)	196 (46.6)	421 (100)	(0.57)
Local chalk taken				
Yes	189 (53.1)	167 (46.9)	356 (100)	0.3
No	48 (56.5)	37 (43.5)	85 (100)	(0.57)

this difference was not statistically significant (p=0.05). There was no significant difference in prevalence of anaemia considering type of family planning used, interpregnancy duration and number of gestation (p>0.05). Anaemia was more common in the second trimester (55.3%) followed by the first trimester (51.8%) and then third trimester (50%), however this was not statistically significant (p=0.75).

Table 6 shows other characteristics of subjects with anaemia. Most (89.0%) had AA genotype and did not have any comorbidity (97.5%). Vomiting, fever, and vaginal bleeding were present in 33.8%, 37.6%, and 8.0%, respectively. Consumption of anti-helminthic, haematinic, lipton, coffee, and local chalk, was reported by 6.8%, 17.3%, 85.2%, 5.1%, and 79.7%, respectively. As shown in table 7 anaemia was significantly commoner among subjects that had AA compared with AS genotype (55.8% vs. 41.3%, p<0.05). Also, significantly higher prevalence of anaemia was found among non-users compared with users of haematinics (59.9% vs. 36.0%, p<0.05). Other clinical factors including presence of vomiting, fever, bleeding, consumption of lipton, coffee and local chalk, were not significantly associated with presence of anaemia (p>0.05)

Discussion

The prevalence of anaemia reported in this study was 53.7% using the World Health Organization criterion of PCV < 33% or < 11 g/dl to define anaemia in pregnancy. This value is comparable to the prevalence of 54.5% reported by Olatunbosun et al[15] in Uyo a neighboring city in the South South zone of Nigeria. It is also similar to the figures 53.05% by Onwuhafua et al[16]in Kaduna, 55.5% by Ojukwu et al[17] in Owerri and 56% by Esike et al[6] in Abakaliki. It is higher than 27.6% reported by Okunade et al[8] in Lagos, 32.2% by Ikeanyi et al[5] in Bayelsa and 41.7% by Nwizu et al[9] in Kano. It is however far lower than 87.21% recorded by Lokare et al[18] in India. Our finding is in tandem with the estimate given by WHO that the prevalence of anaemia among pregnant women ranges from 53.8% to 90.2% in developing countries[12]. This is especially true in our environment where poverty, low socioeconomic status and illiteracy abound as in third world countries[6]. Mild anaemia was the dominant degree of anaemia seen in this study (80%, 189) others had moderate (20%, 48) forms of anaemia (Figure 1). There was no severe form of anaemia in pregnancy. This may be due to the availability of sea foods which are rich in essential amino-acids, vitamins and mineral in these riverine areas and form part of their diet however little. There was a similar finding in other studies where majority of the pregnant women had mild forms of anaemia followed by moderate form of anaemia[9,12,17,19-23]. Studies by Lokare et al[18] and Dorathy et al[24] reported moderate forms of anaemia to be higher than mild and severe forms of anaemia. Like our study severe forms of anaemia were not recorded by Nwizu et al[9], Esike et al[6] and Onoh et al[12].

Most subjects in this study were within 21 to 30 years age bracket (54.4%), married (95.8%), had tertiary level of education (59.9%), and had husbands with tertiary level of education (68.3%) (Table 2). The highest prevalence of anaemia was in pregnant women aged 41 years and above (71.4%) while those aged 31 to 40 years had the lowest prevalence (48.7%) (Table 3). However, this difference was not statistically significant ($P = 0.24$). There was a similar finding by Alemu et al[25] in Ethiopia and Lokare et al[18] in India where the highest prevalence of anaemia was seen in pregnant mothers aged 40-45 years and greater than 30 years respectively but were not also statistically significant. This was different from the findings of Wright et al in West Jamaica where anaemia was more in mothers aged 18–24 years compared to those ≥35 years which was statistically significant [22]. Other studies by Dorothry[24] Ojukwu[17], Okunade[8], Onoh[12] and Gopinath[11] had higher proportion of anaemic women in the teenage age group. The reason advanced was that of suboptimal nutritional status prior

to conception due to increased demand during growth spurt. In our study anaemia was also more prevalent in single mothers compared to the married women but it was also not statistically significant (P=0.18). These single mothers had low income compared to their married counterparts who also received financial support from their spouses. There was a similar finding by Nwizu et al· which was statistically significant. The educational status of the women in our study significantly affected the prevalence of anaemia, with the highest prevalence among those with no formal education, while those with tertiary education had the least prevalence (P=0.04). This was similar to findings in other studies[1,8,9,15,19,20,23,24]. Subjects with monthly salary of ₦100,000 or less had significantly higher prevalence of anaemia, compared with those with higher amount of salary (p=0.01).

In Nigeria of today, however, it is becoming quite difficult to allocate people to social classes based on occupation and educational status since the level of income is not commensurate with these classifications. In this study, despite the high level of education of most of the pregnant women, their earning power was ₦100,000 or less. Since the most common cause of anaemia is nutritional deficiency[20] poverty due to lack of purchasing power or marginal disposable income may be a contributing factor to the occurrence of anaemia. These women may not afford early antenatal services, take appropriate supplementations and eat nourishing meals. A cross-sectional study in New Delhi had revealed that there was a trend of decreasing severity of anaemia with higher per capita income as found in the present study[26].

Compared with multiparous subjects, anaemia was proportionally commoner among those that were primigravid (58.9% vs. 49.6%), though this difference was not statistically significant (p=0.05). An increased risk in primigravidae has been documented by other workers like Onoh et al[12,] Chiwendu et al[20] and attributed these differences to increased susceptibility to malaria in the primigravida. It could also be explained that the primigravida carrying pregnancy for the first time do not fully understand the need for antenatal care and improved nutrition. However other studies showed no effect of parity on haemoglobin levels[8,16,17,19,23] while some other studies showed increased susceptibility to anaemia with increasing parity[9,24]. This could be explained by repeated drain on the iron reserves with increasing parity especially with short inter pregnancy intervals[9,15]. However some other studies showed decreased susceptibility to anaemia with increasing parity[20]. A possible reason is that multiparous women are more likely to have commenced haematinics supplementation at home before coming to register for antenatal care, thereby eroding the effect of repeated pregnancies on the development of anaemia as was seen in this study.

There was no significant difference in prevalence of anaemia considering type of family planning used and interpregnancy duration although women who did not use any family planning method were more likely to be anaemic as well as those with short inter-pregnancy interval of less than 18 months, (p>0.05). This short interval between pregnancies does not allow full recovery of the mother from depleted stores of iron and folate occasioned by previous pregnancies thus increasing the risk of anaemia in subsequent pregnancy[9,17,20].

In this study, most subjects (63.7%) were seen in their second trimester and were multigravid (51.1%), and had singleton gestation (95.8%) (Table 4). This goes to show that late booking is still the norm in this environment. This is similar to reports from other studies[8,9]. It may be attributed to overconfidence in their ability to take care of pregnancy causing late booking, which is more common in multigravidae, and grand multiparous women. The multiparous patients had gained experience from their earlier pregnancies with consequent increased awareness of the value of good diet and care[20]. Anaemia was more common in the second trimester (55.3%) followed by the first trimester (51.8%) and then the third trimester (50%). Although this was not statistically significant, it could well be as a result of exaggeration of the normal physiological decline in blood haemoglobin concentration in the second trimester of pregnancy and increased demand for nutrients for cellular growth by the fetus[14]. There was a similar finding with Okunade et al[8], Chiwendu et al[20] and Nwizu et al[9]. However, there was statistically significance with the study done by Nwizu[9], Owolabi[19] and Dorothry[24]. Other studies showed pregnant women in their third trimester to be more anaemic than in the second and first trimester[17,19,23,27]. Late booking places the woman and the health care providers in a difficult situation due to the limited time for optimum correction of any observed anaemia.

Anaemia was significantly commoner among subjects that had AA compared with AS genotype (55.8% vs. 41.3%, p<0.05, table 7). This is because AS genotype has been reported in the past as being able to protect from anaemia secondary to malaria parasitemia[14].This is achieved through sickling of such red blood cells under low oxygen tension and subsequent destruction along with the parasites by phagocytic cells of the spleen[14]. In other studies, anaemia was more prevalent in women with sickle cell traits than those without such traits[8,24].

In this study anaemia was less common in those women who had used haematinics before booking visit

than in those who had not used any of these medications (p = 0.00). This corroborates the earlier findings of Nwizu et al[9].

The history of bleeding in the index pregnancy was associated with higher risk of anaemia but this was not statistically significant while the report from Uyo showed a significant association between the two. This is at variance with the report from Wright et al[22] in which there was no association between history of bleeding in the index pregnancy and higher risk of anaemia. The reason for this finding could be that implantation bleeds which are not usually heavy may be the cause in most of the clients with history of bleeding[17].

Other factors including presence of vomiting, consumption of lipton, coffee and local chalk, were not significantly associated with presence of anaemia (p>0.05). This is because effect on anaemia probably depends on the quantity, frequency and duration of intake.

Conclusion

This study has shown that the prevalence of anaemia in pregnancy at booking in our environment is still high. It also revealed that low level of education, primary or no education; low income earning, genotype AA and non-use of haematinics prior to booking were significantly associated with increased risk of anaemia at booking. There is need for public health campaigns to emphasize the importance of good nutrition and benefits of booking for antenatal care where interventions and health education can be offered to pregnant women to reduce the incidence of anaemia. Pregnant women with haemoglobin AA should be monitored closely during the antenatal period because of their susceptibility to malaria parasitaemia. The government should improve the socioeconomic situation of our women by ensuring female economic empowerment through provision of good salary paying jobs and improve their ability to ensure proper nutrition and care during pregnancy. Also encouraging utilization of preconception care would ensure that women achieve conception with normal haemoglobin concentration through correction of anaemia and replenishing of iron stores in the pre pregnancy periods.

Limitation of Study

Haemoglobin estimation is superior to packed cell volume in the diagnosis of anaemia because it gives the actual oxygen carrying capacity of blood. The duration of study was short and did not allow far reaching conclusions on the subject matter as would have been obtained if study was spread over longer period.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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