PREVALENCE OF ANAEMIA (REDUCED PACKED CELL VOLUME) AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINICS IN KATSINA METROPOLIS

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ABSTRACT

Anaemia during pregnancy is still a major health problem in malaria endemic countries with clinical consequences including death of both mother and child. Moderate or severe anaemia during pregnancy may be associated with heavy parasitic infestation. This study investigated prevalence of anaemia among pregnant women attending antenatal clinics in Katsina metropolis, Katsina state. A cross-sectional study was carried out among 250 pregnant women attending four different public health centers in Katsina metropolis. Blood samples were obtained to determine their PCV. The PCV count was determined using hematocrit reader. The overall prevalence of anaemia for the all hospital was 110 (44.0%). The highest prevalence of anaemia 54 (84.38%) was recorded among pregnant women attending Turai Yar'adua Maternal and Children Hospital. The least prevalence of anaemia 14 (28.58%) was recorded among pregnant women attending PHC Kofar Marusa. A high prevalence of anaemia among pregnant women in this study was an indication of possible anaemia within the study area. This study advocates the need for pregnant women to undergo routine haemoglobin estimation and early malaria prophylaxis considering the deleterious effects of anaemia on them and their foetus.

Keywords: Anaemia, pregnant women, Antenatal clinic, Katsina, metropolis

INTRODUCTION

Anaemia is a global health issue, disproportionately affecting vulnerable pregnant women (Abdallah *et al*., 2022). Anaemia is one of the commonest complications of pregnancy and birth challenge amongst pregnant women across the world with an epidemiology of over 2 billion cases. Anaemia is when there is not enough red blood cells to carry oxygen throughout the body (Black *et al*., 2013). Anaemia in pregnancy is a disease condition that is established when the packed cell volume value is less than 33%. It is measured as a ratio of red blood cell percentage of a blood sample (Abdulazeez *et al.,* 2020). Anaemia in pregnancy can affect the growth of the foetus, especially during the first trimester and if the anaemia goes untreated, the baby will be at higher risk of having anaemia at birth, which can lead to developmental problems. Also anaemia increases the risk of delivering the baby early and having a low-weight baby. Main causes of anaemia may be due to iron, folic acid and vitamin B12 deficiency, parasitic infections such as malaria and hookworm and chronic infections (McClure *et al*., 2014; Sunguya *et al*., 2021). Up to 52% of pregnant women in developing countries do not get enough of iron due to undernutrition (Babatunde *et al*., 2012; Turgeon 2012; Black *et al*., 2013; Abu-Ouf and Jan 2015). Both mild and severe anaemia require treatment to protect the health of mother and foetus. Anaemia is the most common symptom of malaria in pregnancy and usually develops during the second trimester (Lara 2021). Anaemia in pregnancy has been associated with maternal morbidity and mortality and is a risk factor for preterm delivery, low birth weight and post-partum infections (Okafor *et al*., 2012; Lara 2021). This study investigated the prevalence of anaemia among pregnant women attending antenatal clinics in Katsina metropolis, Katsina state. This study revealed a high prevalence of anaemia among pregnant women attending antenatal clinics in Katsina Metropolis with a prevalence of 44.0%.

MATERIALS AND METHODS

Description of Study Area

This study was carried out in four public health centers namely; Katsina General Hospital, Turai Umar Yar'adua Maternal and Children Health Care Centre, Comprehensive Health Centre Kofar Kaura (CHC) and Primary Health Care Kofar Marusa (PHC) providing antenatal services in Katsina metropolis, Katsina state. Katsina State, covering an area 23,938 sq. km., is located between latitudes 11Â°08'N and 13Â°22'N and longitudes 6Â°52'E and 9Â°20'E. The State is bounded by Niger Republic to the North, Jigawa and Kano States to the East, Kaduna State to the South and Zamfara State to the West. As of 2007, Katsina's estimated population was 459,022 with total annual rainfall ranging from 600 to 700mm and 1000mm to over 800mm in the eastern part of the State's Metropolis. The city is the Centre of an agricultural region producing groundnuts, cotton, hides, millet and guinea corn, and also has mills for producing peanut oil and steel (Wikipedia, 2010).

Criteria for Selection and Data Collection

The study population consisted of pregnant women of different ages, education status, gestational age (trimester), occupation and gravidity attending antenatal clinics in the four selected public health centers. The quantitative method of data collection was employed, and data was collected with the aid of a pre-tested structured questionnaire from each of the pregnant patients visiting the public health centres. A total of 250 pregnant women were randomly selected across the four (4) public health centres.

Sampling technique and sample size

The sample size was calculated with a prevalence of 20% for malaria in pregnancy obtained from a previous report on malaria and anaemia among pregnant women living in communities along the coast of Lagos Lagoon, South-west Nigeria (Olukosi and Afolabi, 2018). The sample size was estimated using the formula below;

$$n = \frac{Z^2 pq}{d^2}$$

Where: n = the sample size, Z = standard deviation at 95% confidential interval [1.96]

d = degree of prevalence [20% obtained from previous study], q = 1− p, failure rate [80%]
This gives a total of 250 subjects who were enrolled for this study.

Consent and Ethical Approval
Consent and ethical clearance were obtained from both the patient and Katsina state ministry of health respectively.

Blood Collection
Blood samples were aseptically collected into ethylene-diamine tetra acetic acid (EDTA) bottles as described by Moody *et al.* (2002). Exactly 5ml of blood sample was collected by venipuncture from each pregnant woman using a sterile needle and syringe with the assistance of medical personnels at each selected health care center.

Determination of packed cell volume (PCV)
Each non-heparinized capillary tube was labelled and filled with the blood sample from the ethylene-diamine tetra acetic acid (EDTA) bottle. The tips of the capillary tubes with blood samples were cleaned with cotton wool, sealed and arranged

in a hematocrit centrifuge before centrifuging at 1200 rpm. The packed cell volume was then determined by using hematocrit reader (Polycarp *et al.,* 2013).

Data Analysis
Data collected were analyzed using SPSS version 20.0 (IBM Corporation, NY, USA). The presence or absence of malaria parasite was computed and the differences in prevalence between age groups, educational status, Occupation, gestational age, gravidity and knowledge about malaria were calculated using chi-square test at a 95% level of confidence. Microsoft excel was used to calculate the simple frequency.

RESULTS AND DISCUSSION
Out of the total number of 250 pregnant women examined for anaemia, the overall prevalence of anaemia for the all hospitals was 110 (44.0%) (Table 1). The highest prevalence of anaemia was recorded among pregnant women attending Turai Yar'adua Maternal and Children Hospital with an occurrence of 54 (84.38%), while the least prevalence of anaemia was recorded among pregnant women attending PHC Kofar Marusa with an occurrence 14 (28.58%).

Table 1: Overall Prevalence of Anaemia in the Clinics Studied

Study Area	No examined	Anaemic (%)
General Hospital Katsina	62	20 (32.26)
Turai Yar'adua Maternal and Children Hospital	64	54 (84.38)
CHC Kofar Kaura	62	22 (35.48)
PHC Kofar Marusa	62	14 (22.58)
Total	250	110 (44.0)

The ages of the respondents in relation to prevalence of anaemia are shown in Table 2. **In** the study area, age range of 18 – 22years was observed to have the highest prevalence of anaemia with an occurrence of 23 (35.94%), followed by 14 (21.86%) at Turai Maternal and Children Hospital while the least prevalence of anaemia was recorded in age range of 43years and above with an occurrence 1 (1.56) at Turai Maternal and Children Hospital. There was no statistical significant association between the anaemia and age of the pregnant women (p value = 0.340).
The occupation of the respondents in relation to prevalence of anaemia (Table 4) showed that house wives had the highest prevalence of anaemia 27 (42.19%), followed by the petty

traders with an occurrence of 21 (32.81%) at Turai Maternal and Children Hospital and then by petty traders with an occurrence of 17 (27.42%) at PHC Kofar Marusa. The students had the least prevalence of anaemia with 1 (1.56%) at Turai Maternal and Children Hospital.
The secondary school certificate holders had the highest prevalence of anaemia (45.31%) at Turai Maternal and Children Hospital while those with non-formal and tertiary educational level recorded the least occurrence of 1 (1.56) and 1 (1.61%) at Turai Maternal and Children Hospital and General hospital respectively. There was no statistical significant association between anaemia of pregnant women by education level (p = 0.186).

Table 2: Prevalence of Anaemia in Relation to Age, Occupation and Education of Pregnant Women Attending Antenatal Clinics in Katsina Metropolis

Variables	GH Katsina		Turai Yar'adua MCHCC		CHC Kofar Kaura		PHC Kofar Marusa	
	NE	Anaemia (%)	NE	Anaemia (%)	NE	Anaemia (%)	NE	Anaemia (%)
Age group (years)								
18 – 22	17	2 (3.23)	29	23 (35.94)	8	0 (0.00)	6	1 (1.61)
23 – 27	17	3 (4.84)	16	14 (21.86)	20	7 (11.29)	23	9 (14.52)
28 – 32	9	1 (1.61)	11	10 (15.63)	8	1 (1.61)	9	2 (3.23)
33 – 37	12	1 (1.61)	3	6 (9.38)	18	3 (4.84)	4	4 (6.45)
38 – 42	6	2 (3.23)	0	0	3	1 (1.61)	12	2 (3.23)
43 – above	1	1 (1.61)	1	1 (1.56)	5	5 (8.06)	8	7 (11.29)
P – value		0.321		0.340		0.184		0.001
Occupation								
House wife	32	7 (11.29)	35	27 (42.19)	30	5 (8.06)	38	8 (12.90)
Petty trader	28	3 (4.84)	22	21 (32.81)	24	12 (19.35)	24	17 (27.42)
Civil servant	1	0 (0.00)	6	5 (7.81)	0	0 (0.00)	0	0 (0.00)

Variable	NE	Anaemia (%)	NE	Anaemia (%)	NE	Anaemia (%)	NE	Anaemia (%)
Student	1	0 (0.00)	1	1 (1.56)	8	0 (0.00)	0	0 (0.00)
P – value		0.190		0.201		0.006		0.074
Education								
Non formal	4	0 (0.00)	2	1 (1.56)	26	8 (12.90)	24	8 (12.90)
Primary	9	2 (3.23)	5	2 (3.16)	16	2 (3.23)	18	12 (19.35)
Islamic	6	2 (3.23)	7	7 (10.98)	7	2 (3.23)	9	2 (3.23)
Secondary	38	5 (8.06)	32	29 (45.31)	11	5 (8.06)	11	3 (4.84)
Tertiary	5	1 (1.61)	18	15 (23.44)	2	0 (0.00)	0	0 (0.00)
P – value		0.180		0.186		0.003		0.003

GH: General Hospital Katsina; MCHCC: Turai Umar Yar'adua Maternal and Children Health Care Centre; CHC: Comprehensive Health Centre Kofar Kaura; PHC: Primary Health Care Kofar Marusa; NE: Number examined

Prevalence of anaemia and trimester among pregnant women attending antenatal clinics in Katsina metropolis (Table 3) showed that women in their second trimester had the highest prevalence of anaemia (45.31%), then followed by pregnant women in their third trimester with (34.38%) at Turai Maternal and Children Hospital and then followed by those in their second trimester with (22.58%) at PHC Kofar Marusa while the least prevalence of anaemia was observed among women that are in their first trimester with (1.61%) at General Hospital.. There was no statistically significant association between the anaemia in pregnant women and trimester (p = 0.631).

Based on the gravidity of the participants shown in Table 3, the multigravidae pregnant women had the highest prevalence of anaemia (42.19%), while the least prevalence of anaemia by gravidity was observed among the women in their Primigravidae with (1.61%) at General Hospital. There was statistically significant association between the anaemia in pregnant women and gravidity (p = 0.03).

Table 3 also revealed that 10 (16.13%) of the respondents at Turai Maternal and Children Hospital got the awareness of anaemia through personal experience, while 1 (1.61%) of the respondent at General Hospital and PHC Kofar Marusa got awareness through media. There was no statistically significant association between the anaemia of pregnant women and source in awareness (p = 0.093).

Table 3: Prevalence of Anaemia in Relation to Trimester, Gravidity and Awareness of Pregnant Women Attending Antenatal Clinics in Katsina Metropolis

	GH Katsina		Turai Yar'adua MCHCC		CHC Kofar Kaura		PHC Kofar Marusa	
Variables	NE	Anaemia (%)	NE	Anaemia (%)	NE	Anaemia (%)	NE	Anaemia (%)
Trimester								
1st	13	1 (1.61)	3	3 (4.68)	14	3 (4.84)	7	2 (3.23)
2nd	20	4 (6.45)	34	29 (45.31)	22	6 (9.68)	31	14 (22.58)
3rd	29	5 (8.06)	27	22 (34.38)	26	8 (12.90)	24	9 (14.52)
P – value		0.141		0.631		0.060		0.185
Gravidity								
Primigravidae	23	1 (1.61)	15	14 (21.88)	12	3 (4.84)	9	5 (8.06)
Secundigravidae	9	2 (3.23)	20	13 (20.31)	18	9 (14.52)	22	9 (14.52)
Multigravidae	30	7 (11.29)	29	27 (42.19)	32	5 (8.06)	31	11 (17.74)
P – value		0.021		0.034		0.052		0.001
Source of Awareness								
Media	6	1 (1.61)	0	(0.00)	0	(0.00)	4	1 (1.61)
Awareness	12	2 (3.23)	18	(0.00)	8	7 (11.29)	12	2 (3.23)
Personal experience	44	3 (4.84)	46	(0.00)	54	10 (16.13)	46	7 (11.29)
P – value		0.001		0.00		0.093		0.006

GH: General Hospital Katsina; MCHCC: Turai Umar Yar'adua Maternal and Children Health Care Centre; CHC: Comprehensive Health Centre Kofar Kaura; PHC: Primary Health Care Kofar Marusa; NE: Number examined.

Discussion

Anaemia in pregnancy has been associated with maternal morbidity and mortality and is a risk factor for low birth weight (Achidi *et al.,* 2005; Lara 2021). This study revealed a high prevalence of anaemia among pregnant women attending antenatal clinic in Katsina Metropolis, Katsina State. Malaria infection during pregnancy can have adverse effects and these include maternal anaemia, foetal loss, premature delivery, intrauterine growth retardation and delivery of low-birth-weight infants (Okafor *et al.,* 2012).

The prevalence of anaemia in the present study was 44.0%, This agrees with a study conducted by Obi (2021) who reported a prevalence of maternal anemia to be 41.6% in Delta State, Nigeria. Rouamba *et al*. (2021) reported similar prevalence of anemia (35.9% and 46.6%) from data collected in 2013/2014 and 2017 in Burkina Faso. In contrast Babatunde *et al*. (2021) reported a prevalence of 60.4% in

Ilorin and Olukosi and Afolabi (2018) in their study in Lagos, Nigeria had higher results of 81.4% prevalence of anaemia. According to Desai *et al.* (2007) and McClure *et al.* (2014), malaria infection is highly associated with anaemia and poor pregnancy outcome at all levels of pregnancy. Also White, (2018) reiterated that malaria infection is associated with maternal anemia. These authors stated that *P. falciparum* was directly linked with maternal death in a low transmission setting while in a high transmission setting, it was an indirect cause of mortality through maternal anaemia. The prevalence of anaemia among pregnant women, in this study, was also found to be highest in the second trimester with prevalence of 45.31%, unlike that reported by Olukosi and Afolabi (2018) in Lagos in which their study revealed first trimester having a low prevalence of 27.5%. but with a higher prevalence of anaemia (84.1%). It differed from the report by Bassi *et al.* (2016) in Jos, who reported prevalence of anaemia in pregnant women to be 65.3% in first trimester. Similarly, Bankole *et al.* (2012) in Benin city reported a higher prevalence of 78.9% malarial infection and 46.2% anaemia among the pregnant women. The higher prevalence observed might be linked to most pregnant women's unwillingness to attend antenatal clinics early for proper monitoring and collection of Intermittent Preventive Therapy (IPT) when necessary (Wogu and Ndukai, 2018).

CONCLUSION

A high prevalence of anaemia among pregnant women in this study was an indication of possible anaemia within the study area. This study advocates the need for pregnant women to undergo routine haemoglobin estimation and early malaria prophylaxis considering the deleterious effects of anaemia on them and their foetus. All pregnant women attending antenatal should be counseled regularly on the need to take balanced diets because they are rich in essential micronutrients that will improve their immunity.

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