Prevalence and Factors Associated with Anaemia among Pregnant Women in their Second and third Trimesters attending Antenatal Care at Kisoro District Hospital, Kisoro District: A Cross Sectional Study.

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Abstract

Background:
There is an increase in the incidence of anemia among pregnant women in Uganda despite the several interventions implemented during antenatal care clinics in public and private health care facilities.

Purpose:
To determine the prevalence of anemia and its associated factors among pregnant women seeking antenatal care in Kisoro District Hospital in Kisoro district.

Methods:
A cross-sectional study was conducted among 265 pregnant women who were selected by simple random technique from the ANC clinic. Blood samples were collected and their Haemoglobin levels were estimated for anaemia. A questionnaire was administered to the pregnant women who consented to the study to establish the factors associated with anaemia. Data were analyzed in univariate and bivariate using the chi-square test to determine factors associated with anaemia at a 95% confidence interval.

Results:
Findings showed that the prevalence of anaemia among pregnant women in their second and third trimesters was 14% (37/265). The prevalence of anaemia was high among pregnant women in the second trimester compared to the third trimester. A total of 158 (59.6%) pregnant women were in the second trimester out of which 24 (15.2%) pregnant women were anaemic. There were 107 (40.4%) pregnant women in the third trimester of pregnancy and 13 (12.1%) were diagnosed with anaemia. The factors associated with anaemia included recent malaria infection ($p=0.001$), not eating a balanced diet ($p=0.032$), and irregular taking of iron and folate tablets (fefo) ($p<0.05$).

Conclusion and recommendation:
Anaemia among this study population is lower than the national average which reveals its existence in this population. Pregnant women should be monitored regularly for proper control and preventive measures of malaria in pregnancy. Stakeholders should promote dietary diversity and improvement of socioeconomic status at the household level. Need to improve the frequency of antenatal visits, as means to monitor the intake of fefo tablets.

Email: ivanoburu@gmail.com Date submitted: 21st/03/2022 Date Accepted: 18th/04/2022

1 Background:

WHO (2011) estimates indicate that 50% of pregnant women suffer from anemia globally. The commonest cause is iron deficiency 1401854:24836926. There is a high variation in the global prevalence of anaemia during pregnancy, ranging from 17% to 61% in Europe and Africa respectively (Breymann, 2015). In Sub-Saharan Africa, iron and folate deficiencies are the most common causes of anemia among pregnant women mostly resulting from nutritional, genetic, and infectious disease factors which cause close to 75% of all anemia cases. Anemia is affecting pregnant women at varying rates across different countries (Stevens et al., 2013, Teshale et al., 2020, Kayode and Adeolu, 2012).

In Uganda, about one in three pregnant women aged 15 to 24 years suffer anaemia (Nankinga and Aguta, 2019a). The proportion of women who suffer anaemia is higher in rural areas 33% compared to urban areas (25%) (MOH, 2017). In Kisoro district, data from the second quarter revealed 34.8% of pregnant women to be anemic, HMIS report Kisoro District Hospital (2020), and this was slightly far higher compared to the national prevalence and other prevalence from different studies within the country. There is an increase in the incidence of anemia among pregnant women in the district. The HIMS 2nd quarter 2020 report of Kisoro district showed that 34.8% of the women attending ANC suffered anaemia in the reporting period. This increased incidence has resulted in increased neonatal and perinatal death, more antenatal admissions, and cases of preeclampsia, placenta Previa, caesarian delivery, and occasionally maternal deaths reported in the district (Smith et al., 2019, Ali et al., 2011).

Despite government national interventions and district health office efforts towards preventing anemia in pregnancy by providing health education, community sensitization by VHTs and Peer mothers, provision of free iron supplements, and deworming during antenatal care, a high number of mothers still suffer anemia in the course of their pregnancy. National data shows that 3 out of every 10 mothers experience anaemia while pregnant. The current status of the prevalence and factors contributing to the failure of the above interventions to reduce the incidence of anaemia in Kisoro has not been explored. Therefore, this study sought to determine the prevalence of anemia and its associated factors among pregnant women seeking antenatal care in Kisoro District Hospital.

The prevalence of anemia (70%) in pregnant Ghana and their second trimester is unacceptably high. Twenty-seven (18%) of the 70% anaemic subjects had low serum iron and six (4%) had low serum folate levels. None of the subjects had vitamin B12 deficiency. Generally dietary intake in pregnant women in this the study was adequate, but a significant proportion of their meals was of the type low in bioavailable iron as more cereals and tubers were consumed. The kind of diet, which most people can afford in Africa is low in proteins and vitamins, but high in carbohydrates with high phytate contents and this reduces iron absorption.

Iron and folic acid prophylaxis for all women of childbearing age is recommended and emphasis on a more balanced nutritional intake at antenatal clinics should be encouraged.

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2 METHODOLOGY

Study setting and population

The study setting was Kisoro District Hospital located in the southwestern region of Uganda. The hospital has a bed capacity of 120 people and serves a total population of approximately 315,400 patients annually. The study was conducted from April 2021 to May 2021. The study participants were recruited in April, while the data collection was carried out in May 2021.

Study design

The study adopted a descriptive cross-sectional study design that used quantitative and qualitative data collection methods to establish the prevalence of anaemia in Kisoro District Hospital. Data were collected to determine the prevalence of anemia. Factors associated with the prevalence of anaemia were determined by a chi-square test. All information was descriptive and was done and presented numerically.

Inclusion criteria

The study recruited pregnant women in their second and third trimester attending ANC at Kisoro District Hospital, who willfully gave informed consent to participate in the study.

Exclusion criteria

Pregnant women who were in their second and third trimesters who were sick in critical condition to answer questions were excluded from the study.

Sample size estimation.

The sample size was determined following standard methods for an infinite population, n=z2pq/d2(Kish,1965), where d is the margin of error(e=0.05), p is the prevalence of anaemia and associated risk factors among pregnant women, and z is the confidence interval that was set at 95%. The prevalence of anaemia and associated risk factors among pregnant women attending Hoima and Gulu regional hospitals was set at 22% (Obai et al., (2016) 1401854:24836921. Overall a sample size of 265 participants was obtained

Sampling method

This study adopted the simple random method for selecting participants. This technique was chosen to provide equal chances to all participants and to minimize bias. This method was executed by first obtaining the list of mothers from the ANC register where data for pregnant women in second and third trimesters were registered daily. Pregnant women in the second and third trimesters were brought together in the counseling room for a briefing about the study. Small papers labeled 'yes' or 'no' were placed in a small box with the number of 'yes' papers corresponding to the number of participants required to be sampled daily. Mothers were made to pick the papers without replacing them. Those who picked 'yes' were made to consent and those who accepted to consent were automatically recruited into the study. All Pregnant women irrespective of their age who met the inclusion criteria were excluded if they did not consent to the study or were severely sick and in critical condition. The study included all pregnant women in their second and third trimesters who attended the ANC at Kisoro District Hospital and consented to the study. All Pregnant women who were in their second and third trimesters who consented to the study and were critically ill were excluded from the study.

Data collection process

Data was collected through interviews and through laboratory investigation of blood samples to determine the hemoglobin levels. Questionnaire-based interviews were conducted to determine the factors associated with anaemia while laboratory investigations were done to determine the prevalence of anaemia among pregnant women. A whole blood sample was collected in EDTA vacutainers and run by Humacount 30 machine to estimate Hb level in g/dL as a measure of anaemia. The questionnaire was piloted among 10 pregnant women from the Mbarara regional referral hospital. All research assistants underwent training on how to administer the questionary study. The data was analyzed and this information was used to make amendments to the questionnaire to ensure quality data collection. Standard Operating Procedures (SOPs) for specimen collection and Haemoglobin estimation were followed. Hemoglobin levels were determined using Humacount 30 after calibrations and controls had been run and passed. Permission to conduct the study was obtained from the Medical Superintendent of Kisoro Hospital and the antenatal clinic in charge. To keep good track of the results, proper labeling of the samples was critical, all blood samples were labeled with unique patient identification, time, and date of collection. The researchers ensured total safety practice through the use of Personal Protective Equipment (PPEs) such as gloves and laboratory coats.

3 Data analysis

Data were analyzed in SPSS and Microsoft Excel, using both univariate and bivariate analysis. The prevalence of anaemia was measured as the percentage of pregnant mothers whose hemoglobin level was Hb g/dl below 11g/dl among all the mothers in their second and third trimesters. Univariate analysis was done to assess the demographic characteristics of study participants. Factors associated with anaemia were determined in a bi-

variate analysis from a 2 by 2 table by analyzing self-medication (dependent variable) against each independent variable. The relationships between the study variables and the prevalence were determined using Pearson's chi-square statistical technique.

4 RESULTS

A total of 373 pregnant women attending ANC at Kisoro district hospital were examined and found eligible for the study, 361 (96.9%) of whom consented to participate. The 12 pregnant women who did not consent were too sick. And another 96 pregnant women withdrew after issuing to them the questionnaire and during blood collection for hemoglobin estimation levels due to a phobia of blood, some withdrew without giving clear reasons claiming it would waste their time despite explaining to them that it won't take more than 15 minutes. Blood samples for hemoglobin estimation and biodata from 265 pregnant women were taken giving us (100%)participation.

5 Respondent's Socio-demographic characteristics of respondents.

Table 1 shows that a majority of 136 (51.3%) of the pregnant women were aged between 21 and 30 years while only 16.6% and 32.1% of the pregnant women were aged less than 20 years and more than 31 years respectively. Nearly all (98.5%) of the pregnant women reported being married. Education levels varied proportionately among the pregnant women reducing from 36.2% ending in primary, 33.9% attaining secondary education, and 26.0% ever reaching the tertiary level of education. Most 144 (54.3%) came from a rural setting while 121 (45.7%) came from urbancenters. A majority (90.9%) of the respondents spoke Rwandese/Rufumbira languages. Most of the respondents 158 (59.6%) were in their second trimester while 107 (40.4%) of the pregnant women studied were in their third trimester of pregnancy.

Prevalence of anaemia

Overall, the prevalence of anaemia among pregnant women was 14% (37/265). The prevalence of anaemia was high among pregnant women in the second trimester compared to their counterparts in the third trimester. A total of 158 (59.6%) pregnant women were in their second trimester out of which 24 (15.2%) were anaemic. There were 107 (40.4%), pregnant women in their third trimester of pregnancy, and only 13 (12.1%) were diagnosed with anaemia as shown in figure 1.

6 Prevalence of anaemia by trimester among pregnant women (n=265)

7 Factors associated with anaemia among pregnant women.

$p>0.05$ means there is no association. $p<0.05$ means the variable is associated with anaemia.

Table 2 above shows the distribution of anaemia prevalence and factors associated with anaemia. For all the factors assessed, anaemia was associated with malaria infection ($p=0.001$), not eating a balanced diet ($p=0.032$), and irregular taking fefo ($p<0.05$). The prevalence of anemia was high (16%) among pregnant women aged 31-49 years and 11% among pregnant women below 20 years of age. The prevalence was also high among housewives (15%) compared to pregnant women in formal employment (13%). Pregnant women with no education had an increased prevalence of anaemia (20%), those with primary education had (11%), secondary education (14%), and tertiary education (16%). Pregnant women who resided in urban areas had a higher prevalence of anaemia (17%) compared to 11% prevalence among pregnant women who resided in rural areas. The prevalence of anaemia was low (11%) among pregnant women who had more than 5 pregnancies and high among pregnant women who had1-2 pregnancies.

8 DISCUSSION

Findings showed that the prevalence of anaemia among the surveyed pregnant women was 14%. These results are lower than the national average of 30% reported from pooled prevalence studies of anemia among pregnant women in Uganda 1401854:24836928. The findings are much lower than the prevalence of anaemia of 32.9 % reported in Gulu and slightly higher

Table 1. showing respondent's socio-demographic characteristics

Variable	Category	Frequency. (n=265)	Percentage
Age	Below 20 years	44	16.6%
	21-30 years	136	51.3%
	31-49 years	85	32.1%
Marital status	Divorced/separated	4	1.5%
	Married	261	98.5%
Education level	None	10	3.8%
	Primary	96	36.2%
	Secondary	90	33.9%
	Tertiary	69	26.0%
Residence	Rural	144	54.3%
	Urban	121	45.7%
Language	Rukiga	19	7.2%
	Runyakitara	5	1.9%
	Rwanda/Rufumbira	241	90.9%
Trimester	2nd trimester	158	59.6%
	3rd Trimester	107	40.4%

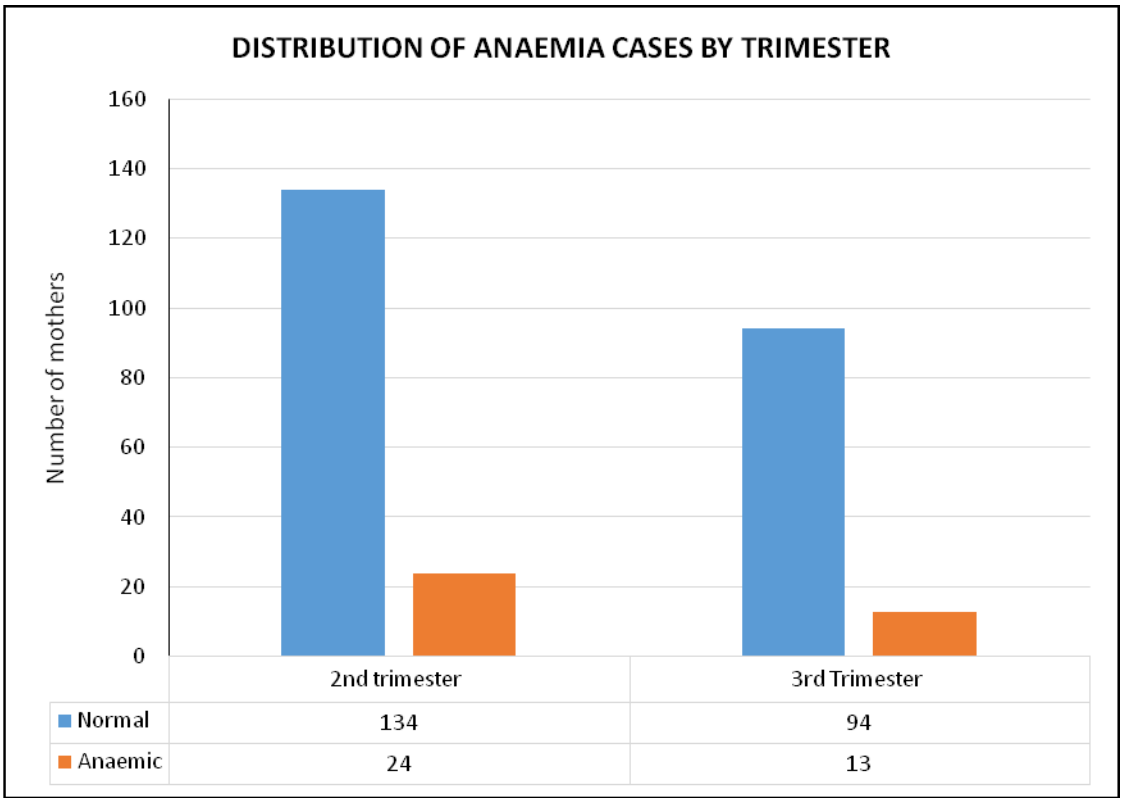

Figure 1. Distribution of anaemia cases by trimester

Table 2. Factors associated with anaemia among pregnant women

Variable	Category	Anaemia status		Frequency	Chi^2
		No	**Yes**		**p-value**
Age	Below 20 years	39 (89%)	5 (11%)	44 (17%)	0.686
	21-30 years	118 (87%)	18 (13%)	136 (51%)	
	31-49 years	71 (84%)	14 (16%)	85 (32%)	
Marital status	Divorced /Single	3 (75%)	1 (25%0	4 (2%)	0.521
	Married	225 (86%)	36 (14%)	261 (98%)	
Education status	None	8 (80%)	2 (20%)	10 (4%)	0.790
	Primary	85 (89%)	11 (11%)	96 (36%)	
	Secondary	77 (86%)	13 (14%)	90 (34%)	
	Tertiary	58 (84%)	11 (16%)	69 (26%)	
Occupation	Housewife	97 (85%)	14 (15%)	111 (42%)	0.765
	Self-employed	92 (84%)	15 (14%)	107 (40%)	
	Formal employed	39 (83%)	8 (13%)	47 (18%)	
Suffered malaria	Yes	75 (77%)	23 (23%)	98 (37%)	0.001**
	No	153 (91%)	14 (8%)	167 (63%)	
Residence	Rural	128 (89%)	16 (11%)	144 (54%)	0.144
	Urban	100 (83%%)	21 (17%)	121 (46%)	
Regularly eat balanced diet	Yes	129 (90%)	14 (10%)	143 (53%)	0.032*
	No	99 (81%)	23 (19%)	122 (47%)	
ANC visits	1	109 (88%)	15 (12%)	124 (47%)	0.486
	2	75 (82%)	16 (18%)	91 (34%)	
	3	38 (90%)	4 (10%)	42 (16%)	
	4 and above	6 (75%)	2 (25%)	8 (3%)	
History of Abortions	No History	177 (85%)	32 (15%)	209 (79%)	0.221
	Previous history	51 (91%)	5 (9%)	56 (21%)	
Regularly takes Fefol	Yes	201 (94%)	12 (6%)	214 (81%)	0.000***
	No	27 (54%)	24 (24%)	51 (19%)	
Any food restrictions	No	221 (86%)	36 (14%)	257 (99%)	0.485
	Yes	3 (100%)	0 (0%)	3 (1%)	
Gravida	1-2	141 (85%)	24 (15%)	165 (62%)	0.836
	3-5	54 (86%)	9 (14%)	63 (24%)	
	5 above	33 (89%)	4 (11%)	37 (14%)	
Parity	0	95 (83%)	19 (17%)	114 (43%)	0.326
	1-2	82 (86%)	13 (16%)	95 (36%)	
	3-5	44 (94%)	3 (6%)	47 (18%)	
	5 above	7 (78%)	2 (22%)	9 (3%)	

than the prevalence of 12.1 % in Hoima district 1401854:24836921. The prevalence of gestational anemia in this study was also lower than that of 25.8% reported in Kisugu Health Centre IV in Kampala 1401854:24836927. The observed variation in the prevalence of anaemia among pregnant women can be attributed to differences in the socioeconomic status of the different populations in different regions of the country which is a major factor that determines nutrition and health-being 1401854:24836916.

This study's findings have shown that the prevalence of anaemia was higher among pregnant women in the second trimester compared to those in the third trimester. A total of 158 (59.6%) pregnant women were in their second trimester out of which 24 (15.2%) pregnant women were anaemic compared to only 13 (12.1%) out of the 107 pregnant women diagnosed with anaemia in the third

trimester. Haemodilution in pregnancy increases to peak during the second trimester which may explain the high prevalence of anaemia during this period. These findings agree with similar results from Porto Novo, Cape Verde, and Abeokuta, Nigeria 1401854:24836922, 1401854:24836920. However other studies have reported contradicting findings showing a higher prevalence of anaemia in the third trimester which indicates poor antenatal care and nutrition 1401854:24836929. The findings in this study could perhaps be because of the health education provided to pregnant women during antenatal visits that led to better health-seeking behavior and dietary habits, especially during early pregnancy 1401854:24836930.

These study findings revealed that reported recent infection with malaria ($p=0.001$), not eating a balanced diet ($p=0.032$), and irregular taking of fefol ($p<0.05$) were associated with anaemia among the pregnant women in their second and third trimester. Although other studies have demonstrated that wealth index, region, and age were associated with anemia in pregnant women (Nankinga and Aguta, 2019b), this study did not find any association with such variables. Related similar studies have shown that having inadequate dietary diversity (balanced diet) is a significant risk factor for anaemia among pregnant women 1401854:24836915. The same study showed that attending ANC was significantly associated with anaemia. Women who do not attend antenatal care do not regularly take their folic and iron tablets and dewormers thus predisposing them to anaemia. These findings could be because most of the respondents in this study were housewives with limited education and low-income levels. This means that these pregnant women cannot afford the dietary diversification required during pregnancy. In addition association between anaemia and recent malaria infection reported in this study is not surprising given that this study was done in during the rainy season favors the mosquito life cycle and that malaria is a known major cause of anaemia 1401854:24836911. In all cases, pregnant women interviewed demonstrated a higher level of awareness of the factors for anaemia. This finding agrees with a study in Tanzania that showed that pregnant women were well aware of the factors and the symptoms of anaemia but their knowledge was not translated into their ability to prevent anaemia 1401854:24836917.

Recommendations:

Pregnant women should be regularly monitored on the proper use of control and preventive measures for malaria in pregnancy.

All Concerned stakeholders should be encouraged to promote dietary diversity and improvement of socioeconomic status at the household level.

Need to improve the frequency of antenatal visits of the affected pregnant women, as means to monitor the intake of folic and iron tablets.

9 Limitations of the study

Like other studies, this study has limitations. First and foremost, this study was only conducted among pregnant women in the second and third trimesters therefore not considering pregnant mothers in the first trimester means that this study does not capture the complete picture of anaemia in pregnancy. Further research is required to assess the factors across the entire period of pregnancy.

Generalizability of the results

The study was conducted in a district hospital hence findings may not be generalized to the pregnant women in their second and third trimesters attending ANC in purely rural health centers.

10 Conclusion,

Although this study has shown a lower prevalence compared to other studies in Uganda, these findings further confirm that anemia in pregnancy is still a public health problem and is likely to continue causing adverse effects and shall require targeted interventions. The findings in this study go a long way in bringing to light the current prevalence of anaemia among pregnant women in their second and third trimesters in Kisoro District Hospital. The prevalence of anaemia was associated with recent malaria infection, irregular taking of fefo, and an inadequately balanced diet. This is especially important because even very mild forms of anaemia have been reported to influence the sense of well-being, lessen resistance to fatigue, lower productivity, aggravate other disorders, and affect work capacity. In pregnant women, anaemia can result in an increased risk of maternal and perinatal mortality, low birth weight, and reduced resistance to blood loss with the result that death may occur from the blood loss associated with delivery.

Ethical consideration

An approval letter was obtained from the Faculty Research Committee (FRC) of the Faculty of Medicine of Mbarara University of Science and Technology.

Author contribution: IO, SA, AK, IO, JI and CA prepared the proposal, collected the data, performed the analysis, wrote a report, and drafted the manuscript. YM and KS supervised the entire research process and approved the study for publication.

Funding:

The authors received no specific funding for this study

Conflict of interest:

There is no conflict of interest for this study

Acknowledgment:

Management and Administration of Kisoro district and Kisoro Hospital provided all the support for the study.

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Publisher: Student's Journal of Health Research (SJHR)
(ISSN 2709-9997) Online
Category: Non-Governmental & Non-profit Organization
Email: studentsjournal2020@gmail.com
WhatsApp: +256775434261
Location: Wisdom Centre, P.O.BOX. 148, Uganda, East Africa.

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