Pre-Operative Anaemia in Newly Diagnosed Patients with Gynaecological Malignancy at a University Teaching Hospital in Southern Nigeria

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Abstract **Introduction:** Anaemia is a common but avoidable negative prognostic factor in newly diagnosed patients with gynecological malignancy. However, there is little information regarding the prevalence of anaemia among newly diagnosed gynaecological cancer patients in developing countries like Nigeria. **Objectives:** To evaluate the prevalence, pattern, and associated factors of pre-operative anaemia in gynaecological cancer patients at the University of Port Harcourt Teaching Hospital. **Materials and Methods:** A cross-sectional study of 146 women diagnosed and managed for gynaecological cancers at the University of Port Harcourt Teaching Hospital between January 1, 2019, and December 31, 2022. A structured interviewer-administered questionnaire was used to obtain socio-demographic and clinical characteristics. Data was entered into a spreadsheet and analyzed with SPSS 25. The 95% confidence interval was used, and a p value of $\leqslant 0.05$ was considered statistically significant. The Chi square test and Pearson's correlation were used to determine the relationship between anaemia and variables. **Results:** The mean age was 53.3 ± 13 years, 96 (65.8%) were married while 49 (33.6%) had tertiary education. One-fifth of the women 30 (20.5%) were traders and skilled workers/farmers 30 (20.5%). The median parity and age at menarche were 4 (4) and 13 (1) years respectively. Majority of the women 75 (52%) were diagnosed with stage III gynaecological cancer. The prevalence of anaemia was 113 (90 %). The highest prevalence was among patients with cervical cancer 42 (75%). There was a significant statistical relationship between anaemia and type of gynaecological cancer ($X2 = 47.539$, p-value <0.001). In addition, there was a significant statistical relationship between level of education ($X2 = 28.633$, p-value <0.001), occupation ($X2 = 42.096$, p-value = 0.001), and anaemia. **Conclusion:** There is a high prevalence of anaemia in patients with cervical cancer and advanced disease. Early presentation, prompt diagnosis, and in severe cases, blood transfusion may be beneficial, and reduce morbidity.

Keywords: anaemia, gynaecological cancer, prevalence, associated factors, Port Harcourt, Nigeria

1. Introduction

Anaemia is defined as a decrease in the number of red blood cells or a decrease in the amount of haemoglobin (Hb) in the blood, which can lead to reduced oxygen delivery to tissues and organs [1]. The World Health Organization (WHO) defines anaemia in women as Hb levels less than 12g/dl [2]. Anaemia is reported to affect at least 30% of persons with malignancies and between 26% and 85% of those with gynaecologic malignancies, making it a common condition among cancer patients [3,4]. Gynaecological cancers encompass a diverse group of tumours with different epidemiological features, clinical presentation, and treatment strategies [5,6,7]. In gynaecological malignancies, anaemia can be caused by several factors, including chronic blood loss due to tumour bleeding or invasive procedures, bone marrow suppression from chemotherapy or radiotherapy, and nutritional deficiencies [8,9].

Anaemia has been shown in several studies to be associated with poor treatment response and overall survival in ovarian, endometrial, cervical, and vulvar malignancies [7,8] [10-12]. In addition, anaemia may result in poor local control of tumour, which may be due to tumour hypoxia-mediated therapy resistance [7] [13,14].

Studies have shown that anaemia is a common complication in gynaecological malignancies, with a prevalence of 30% to 70% depending on the type and stage of the cancer. Anaemia can lead to fatigue, weakness, shortness of breath, and reduced physical functioning, which can affect a patient's ability to tolerate cancer treatments and maintain their quality of life [15-18].

Furthermore, anaemia has been associated with poorer treatment outcomes in gynaecological malignancies, including increased rates of treatment discontinuation, higher rates of hospitalization, and reduced survival rates [19,20]. It can also affect the delivery of chemotherapy or radiotherapy, which can lead to dose reductions or treatment delays, thereby potentially compromising the effectiveness of the treatment [4] [13,14].

Hence, the burden of anaemia in gynaecological malignancies is enormous, and healthcare providers should be aware of its potential impact on patient outcomes. The current study was carried out to assess the prevalence, pattern, and factors associated with anaemia in gynaecological cancers at a tertiary healthcare institution in Southern Nigeria.

2. Materials and Methods

2.1. Study Area

This study was conducted at the gynaecological unit of the University of Port Harcourt Teaching Hospital (UPTH). The University of Port Harcourt Teaching Hospital is a 988-bed hospital in Alakahia, in Obio-Akpor Local Government Area of Rivers state. It is a tertiary hospital that serves as a referral centre for all levels of healthcare in Rivers state and other neighbouring states including Bayelsa, Imo and Abia. Every week, the gynaecology clinic is open from Monday to Friday, and each clinic session is led by a team of consultants, resident doctors, house officers, and nurses. Patients are evaluated in the clinic before they are admitted into the gynaecological ward for surgery.

2.2. Methods

This was a cross-sectional study of 146 women diagnosed and managed for gynaecological cancers at the University of Port Harcourt Teaching Hospital between January 1, 2019, and December 31, 2022. Eligible patients were aged > 18 years, had a diagnosis of gynaecological malignancy, and were scheduled for surgery, chemotherapy, or radiotherapy. The purpose of the study was duly explained to the women and an informed written consent was obtained. A structured interviewer-administered questionnaire designed for this purpose was used to obtain socio-demographic and clinical characteristics. Tumour type, tumour stage, and haemoglobin level were also evaluated. The disease stage was evaluated according to International Federation of Gynaecology and Obstetrics (FIGO) 2009 Criteria. The World Health Organization (WHO) classifies anaemia in women as mild if Hb level is 11-11.9g/dl, moderate if Hb level is 8-10.9g/dl, and severe if Hb level is less than 8g/dl [2]. The questionnaire for each patient was checked for completeness before it was entered into a spreadsheet and analyzed. Patients were excluded if they had haematologic, hepatic, or renal diseases.

2.3. Statistical Analysis

The statistical package for social sciences version 25 was used for data analysis. The Chi square test and Pearson's correlation were used to determine the relationship between anaemia and type and stage of malignancies. Results are presented as frequency tables and figures. The 95% confidence interval was used, and a p value of ≤ 0.05 was considered statistically significant.

2.4. Ethical Consideration

Ethical approval to carry out the study was obtained from the Ethics and Research Committee of the University of Port Harcourt Teaching Hospital, prior to the commencement of the study. A written informed consent was obtained from each study participant prior to their inclusion into the study. Personal identifying information of the participants was kept confidential as participants were only issued study identifier numbers.

3. Results

One hundred and forty-six patients were recruited into the study. The mean age of the study participant was 53.3 $\pm$ 13 years. Most of the women (29%) were in the 55-64 years age group, while 30 (20.5%) were aged 65 years and above. Most of the women 96 (65.8%) were married, while 32 (21.9%) were widowed. About one-third of the women 49 (33.6%) had tertiary education, and 30 (20.5%) were craft women and traders and skilled workers/farmers respectively. The median number of children and age at menarche of these women was 4 (4) and 13 (1) years respectively. This is shown in Table 1.

Figure 1 showed the stages of gynaecological cancer of the women at presentation. A greater proportion of the women 76 (52%) had stage III gynaecological cancer, while only 8 (5%) presented in stage 1.
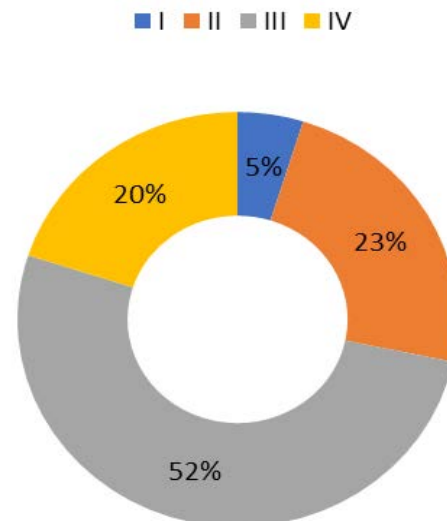

Figure 1. Stages of Gynaecological Cancer among women diagnosed at UPTH

Many of these patients 113 (90%) were diagnosed with anaemia with a greater proportion of 56 (45%) suffering severe anaemia as shown in figures 2 and 3 respectively. Table 2 showed a significant statistical relationship between anaemia and type of gynaecological cancer (X^2 = 47.539, p-value <0.001). Severe anaemia was more prevalent in patients with cervical cancer 42 (75%)

compared with other cancers, while patients with ovarian cancer had mild 12 (52.2%) to moderate 19 (55.9%) anaemia. However, there was no significant statistical relationship between the stage of cancer and anaemia (X^2 = 13.154, p-value = 0.21) as shown in Table 3.

Table 1. Socio-Demographic Characteristics of Women with Gynaecological Cancer

| Attributes	n=146 (%)
Age (years)	
≤24	1 (0.7)
25-34	7 (4.7)
35-44	29 (19.8)
45-54	37 (25.3)
55-64	42 (29.0)
≥65	30 (20.5)
Marital Status	
Single	14 (9.6)
Married	96 (65.8)
Divorced	2 (1.4)
Separated	2 (1.4)
Widowed	32 (21.9)
Education	
None	18 (12.3)
Primary	40 (27.4)
Secondary	39 (26.7)
Tertiary	49 (33.6)
Occupation	
#Technical/Associate Professional	17 (11.6)
$Professional	23 (15.9)
%Clerical support	3 (2.1)
&Elementary	19 (13.0)
!Service /Sales Workers	24 (16.4)
>Skilled Workers/Farmers/Fishermen	30 (20.5)
<Craft/ Related Trade/Traders	30 (20.5)
Median Parity	4 (4)
Median Number of living children	4 (4)
Median Age at Menarche	13 (1)

#: Civil/Public Servant, Auxiliary Nurse; $: Doctors, Engineers, Lawyers, Nurses, Clergy; %: Secretaries, &: Housewives, Students; !: Businessmen; >: Farmers/fishermen <: Tailors, traders, shoemakers

Furthermore, Table 4 showed that there was a significant statistical relationship between patients' education (chi-square = 28.633, p-value <0.001), and occupation (chi-square = 42.096, p-value = 0.001), and anaemia among gynaecological cancer patients. The perioperative blood transfusion rate was 106 (99.1%) with a mean unit of 5 ± 3 units of blood transfused and a median postoperative packed cell volume (PCV) level of 30 (3) %. The median duration of hospital stay was 11(6) days.
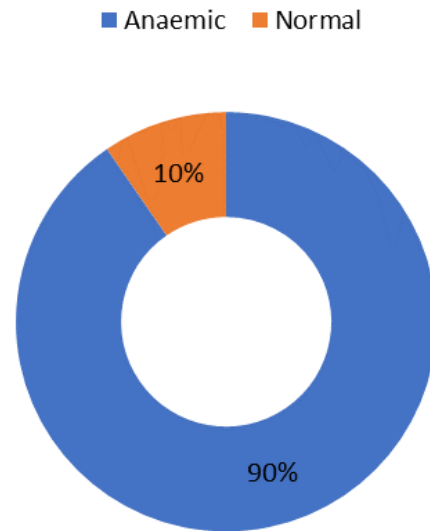
Figure 2. Prevalence of Anaemia among women with Gynaecological Cancer diagnosed at UPTH
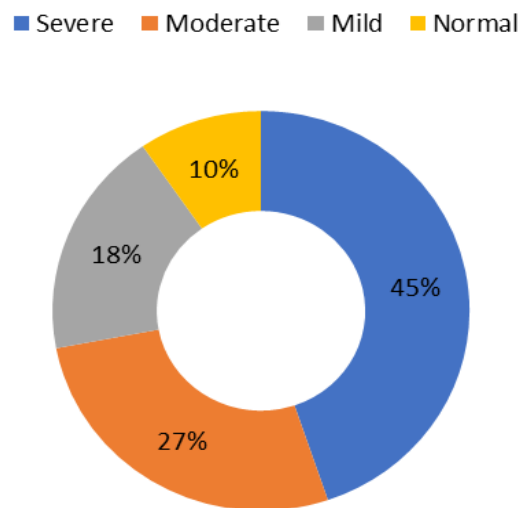
Figure 3. Severity of Anaemia among women with Gynaecological Cancer Diagnosed at UPTH

Table 2. Relationship between Anaemia and Type of Gynaecological Cancer

Attribute	Ovarian Ca	Vulva Ca	Endometrial Ca	Cervical Ca	Chi-Square	P-Value
Mild	12 (44.4)	3 (11.1)	5 (18.6)	7 (25.9)	47.539	<0.001**
Moderate	19 (48.7)	2 (5.1)	3 (7.7)	15 (38.5)		
Severe	10 (16.9)	-	2 (3.4)	47 (79.7)		
Normal	4 (19.0)	2 (9.5)	6 (28.6)	9 (42.9)		

* Significant at p<0.05 in Pearson's chi-square; ** significant at p<0.05 in Fischer's exact (>20%Cells <5) X2; Chi-square; Ca: Cancer

Table 3. Relationship between Stage of Cancer and Anaemia

Attribute	Mild	Moderate	Severe	Normal	Chi-Square	P-Value
I	3 (42.9)	1 (14.3)	1 (14.3)	2 (28.6)		
II	3 (11.1)	4 (14.8)	18 (66.7)	2 (7.4)	13.154	
III	11 (14.2)	25 (32.5)	35 (45.5)	6 (7.8)		0.21
IV	6 (17.1)	12 (34.3)	15 (42.9)	2 (5.7)		

* Significant at p<0.05 in Pearson's chi-square; ** significant at p<0.05 in Fischer's exact (>20%Cells <5) X2; Chi-square; Ca: Cancer

Table 4. Relationship between Socio-demographic characteristics and Anaemia

Attribute	Mild	Moderate	Severe	Normal	X2	P-Value
	1(100)					
Age (years)	1(14.2)	3(42.9)	3(42.9)			
≤24	5(17.2)	11(37.9)	13(44.9)			
25-34	6(16.2)	11(29.8)	16(43.2)	4(10.8)		
35-44	6(14.3)	10(23.8)	20(47.6)	6(14.3)	14.853	0.43
45-54	7(23.4)	4(13.3)	15(50.0)	4(13.3)		
55-64						
≥65						
	1(7.2)	5(35.7)	3(21.4)	5(35.7)		
Marital Status	20(20.8)	27(28.1)	49(51.1)			
Single		1(50.0)	1(50.0)		17.208	0.06
Married		2(100)				
Divorced	8(25.0)	2(6.2)	14(43.8)	8(25.0)		
Separated						
Widowed						
	4(25.0)	1(6.3)	5(31.3)			
Occupation				2(8.7)		
Technical/Associate					42.096	0.001*
Professional	5(21.7)	11(47.8)	5(21.7)			
Professional	1(33.3)	1(33.3)	1(33.3)	2(9.5)		
Clerical support	2(11.8)	1(5.9)	14(82.4)			
Elementary	1(4.8)	9(42.9)	9(42.9)			
Service/Sales Workers						
Skilled Workers/Farmers/						
Fishermen	7(28.0)	7(28.0)	11(44.0)	2(11.8)		
Craft/Related Trade/Traders						
	2(11.8)	4(23.5)	96(52.9)			
Occupation						
Active						
Inactive	15(17.4)	29(33.7)	35(40.7)	7(8.1)		
Retired	4(33.3)	1(8.3)	4(33.3)	3(25.0)		
	1(9.1)	2(18.2)	6(54.5)	2(18.2)	8.736	0.143
Education						
None						
Primary	1(5.6)	2(11.1)	2(11.1)	13(72.2)		
Secondary	9(22.5)	11(27.5)		20(50.0)		
Tertiary	3(7.7)	14(35.9)	3(7.7)	19(48.7)		
	14(28.6)	16(32.7)	8(16.3)	11(22.4)	28.633	<0.001**

* Significant at p<0.05 in Pearson's chi-square; ** significant at p<0.05 in Fischer's exact (>20%Cells <5) X2; Chi-square; Ca: Cancer

Table 5. Clinical Profile of Gynaecological Cancer Patients

Attributes	Units of blood
Mean unit of blood transfused	5±3
Perioperative blood transfusion rate (%)	99.1
Postoperative PCV level (%)	30 (3)
The median duration of hospital stay (days)	11(6)

4. Discussion

The current study found that many patients (72%) were in stages III and IV of their cancer, with 23% in stage 2 and only 5% in stage 1. This is consistent with the findings from other low-and-middle income countries, which reported that between 50% and 70% of gynaecological malignancies in developing countries like Nigeria are diagnosed at a late stage [20-23]. The pattern of malignancy observed also correlates with reports from other parts of Nigeria, indicating that between 40% and 75% of newly diagnosed gynaecological malignancies cases present in advanced stages [13,24,25].

The late presentation for diagnosis and treatment by the patients is an indicator of a relatively low health seeking behaviour commonly reported in similar studies [14,21]. While access to adequate diagnosis is limited in many primary and secondary healthcare centres, a late diagnosis of cancer may be inevitable in some cases [10,24,26].

Anaemia was observed in 90% of patients with gynaecological malignancy at the study centre. Similarly, Alghamdi et al. reported that 90% of persons diagnosed with gynaecological malignancies had anaemia upon examination and during treatment [23]. However, the prevalence of anaemia observed in the current study contradicts the findings by Hufnagel et al., who observed that less than 30% of patients with gynaecological cancers had anaemia at initial presentation, while more than 50% had anaemia by 6 months after diagnosis [1]. This disparity may be due to the retrospective study design, study duration, sample size variation, and early presentation of most patients in the latter study.

It was observed that 72% of persons with anaemia had moderate or severe anaemia compared to 18% who had mild anaemia. According to previous research, the high prevalence of moderate and severe anaemia is expected because most of the patients were in late stages of gynaecological malignancies, which could have exacerbated the decrease in haemoglobin levels in these patients [10,27].

The current study observed a significant association between the severity of anaemia and type of gynaecological

cancer. Severe anaemia was more common in cervical cancer, while moderate anaemia was more common in ovarian cancer. Similar studies have reported a significant association of anaemia with cervical cancers in comparison to other gynaecological malignancies, which is consistent with the current observations [1,3] [26-28].

Anaemia in cervical cancer is caused by iron deficiency and tumour bleeding [29]. The anaemia seen in cervical cancer has the characteristics of a chronic disorder associated with low haemoglobin level. Several factors may be responsible for the high prevalence of anaemia seen among cervical cancer patients, including lower socioeconomic status and poor nutrition of the former, intratumoral bleeding from a friable tumour surface, anorexia associated with cancers in general can also be associated with the nutritional anaemia seen in these cases. In addition, metastasis to the bone marrow from cervical cancer may be associated with suppression of erythropoiesis and infection of the fungating mass on the cervix [23,28-32].

Malnutrition and folate deficiency have both been linked to immune suppression [10,28,33,34]. Folate deficiency is responsible for decreased immunity, which may have contributed to the transmission of the human papilloma virus (HPV) infection, which is thought to be the most important factor in the development of cervix carcinoma. As a result, anaemia may be more common in cervical cancer.

The current study found no correlation between the severity of anaemia and the stage of gynaecological cancers among study participants. Similar observation was made by Alghamdi et al., in Saudi Arabia, who also reported no correlation between tumour grade and anaemia [21]. However, this contradicts the findings of previous studies that found that the prevalence of anaemia was significantly higher among persons with late-stage cancers [1,28]. This discrepancy could be attributed to the smaller sample size and that co-morbidities were not considered in the current study.

There are some limitations to our research. The sample size was small, and the study was conducted in a tertiary facility, so it may not represent the cancer population in Rivers state. This could have resulted in lack of statistical power to detect some associations. However, despite these limitations, this study serves as a reference for future recommendations to improve care of patients with gynaecological cancers through active screening and correction of anaemia prior to commencement of treatment.

5. Conclusion

According to this study, the prevalence of anaemia among women with gynaecological cancer is high, with cervical cancer having a significantly higher prevalence than the other gynaecological malignancies. Most of the women were in advanced stages of cancer, which could explain the high prevalence of anaemia.

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Conflicts of Interest

The authors have no conflicts of interest to declare.

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