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Studies on Serum Ferritin, Iron, Platelet and White Blood Cell Counts in Patients Diagnosed with Cervical Cancer in Owerri, Nigeria.

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Abstract

Background: Cervical cancer is a major cause of morbidity and mortality among women globally. Alterations in hematological and iron-related parameters, such as total white blood cell (TWBC) count, platelet count, serum iron, and ferritin, may provide insights into disease progression and prognosis. Methods: This analytical cross-sectional study was conducted at Imo State University Teaching Hospital (IMSUTH), Orlu, Nigeria. Forty female patients diagnosed with cervical cancer and 20 age-matched healthy controls were enrolled. Venous blood samples were collected for TWBC and platelet counts using an automated hematology analyzer, while serum iron and ferritin were measured via colorimetric and ELISA techniques, respectively. Statistical analyses were performed using SPSS version 25, with $p < 0.05$ considered significant. Results: Cervical cancer patients had significantly elevated TWBC (10.85 ± 4.45) $\times 10^9/\mu L$ and platelet counts (301.15 ± 87.97) $\times 10^9/\mu L$ compared to controls TWBC: (6.39 ± 1.67) $\times 10^9/\mu L$; platelets: (245.65 ± 56.12) $\times 10^9/\mu L$; $p < 0.0001$ and $p = 0.005$). Serum iron (8.23 ± 2.03) µmol/L and ferritin (87.78 ± 69.63) ng/mL were significantly lower than in healthy participants; iron: (12.49 ± 4.47) µmol/L; ferritin: (144.45 ± 73.22) ng/mL; ($p = 0.001$and 0.007). Stratification by disease duration revealed decreasing TWBC and iron levels, but progressively increasing ferritin with longer disease duration. Correlation analysis indicated no significant association between platelet count and TWBC, serum iron, or ferritin.Conclusion: Cervical cancer is associated with significant hematological and iron-related disturbances. TWBC and ferritin levels may serve as accessible biomarkers for disease monitoring, particularly in resource-limited settings. Routine assessment of these parameters could complement standard clinical evaluations and support patient management.

Keywords

Cervical cancer, serum ferritin, serum iron, platelet count, white blood cell count, Nigeria

1.0 Introduction

Cervical cancer remains one of the most prevalent gynecological malignancies worldwide, particularly in low- and middle-income countries. It is largely preventable through early detection, vaccination against human papillomavirus (HPV), and prompt treatment. Despite this, late presentation is common in regions with limited access to healthcare, resulting in significant morbidity and mortality[1].

Alterations in hematological parameters are frequently observed in cancer patients and may reflect systemic inflammation, immune dysregulation, or tumor-related effects[2]. Total white blood cell (TWBC) and platelet counts are commonly affected by inflammatory anparaneoplastic mechanisms, with elevated levels often correlating with tumor burden and prognosis[3].

Iron metabolism is also frequently disrupted in malignancy. Serum iron and ferritin levels provide insight into the body's iron status and storage capacity. Ferritin, an intracellular iron storage protein, typically acts as an acute-phase reactant during inflammation, while serum iron may decline in anemia of chronic disease (ACD) or iron deficiency anemia[4–5].

Evaluating these biomarkers in cervical cancer patients provides a low-cost, accessible method for assessing systemic changes associated with malignancy, particularly in resource-limited settings. This study investigates alterations in TWBC, platelet count, serum iron, and ferritin among cervical cancer patients in Owerri, Nigeria, and examines the relationship of these parameters with disease duration.

2.0 Materials and Methods

2.1 Study Area

The study was conducted at Imo State University Teaching Hospital (IMSUTH), Orlu, Imo State, Nigeria. Orlu is a major urban center in southeastern Nigeria, serving as a commercial, administrative, and healthcare hub. IMSUTH provides tertiary medical services and training for medical and allied health science students, catering to a large population from Orlu and surrounding communities.

2.2 Study Design

An analytical cross-sectional study was performed in September, 2024 to assess hematological and iron-related parameters in patients with cervical cancer. Ethical approval was obtained from the Health Research Ethics Committee of IMSUTH. Written informed consent was secured from all participants after explaining the study objectives, procedures, benefits, and risks.

2.3 Study Population and Recruitment

Participants included 40 female patients diagnosed with cervical cancer and 20 age-matched healthy controls. Patients were recruited from the gynecology clinic at IMSUTH, while controls were healthy volunteers. Inclusion criteria were: age ≥18 years, confirmed diagnosis of cervical cancer, and willingness to provide informed consent. Exclusion criteria included: concurrent malignancies, hematological disorders, chronic diseases such as liver disease or HIV/AIDS, hormonal therapy, or medications affecting iron metabolism.

2.3 Sample Collection

Venous blood (7 mL) was collected aseptically from each participant. Two milliliters were placed in EDTA tubes for TWBC and platelet analysis, and 5 mL in plain tubes for serum iron and ferritin assessment. Blood samples were transported promptly to the laboratory for analysis.

2.4 Laboratory Analysis

2.4.1 Total White Blood Cell and Platelet Counts

EDTA samples were analyzed using an automated hematology analyzer (Sysmex XP-300) following standard procedures. Platelet counts were confirmed using a hemocytometer and ammonium oxalate diluent, while TWBC counts used Turk's solution for staining and dilution.

2.4.2 Serum Iron

Serum was separated via centrifugation at 3,000 rpm for 10 minutes. Serum iron was measured using the colorimetric ferrozine method, in which ferric iron is reduced to ferrous iron and reacts with a chromogen to form a measurable colored complex.

2.4.3 Serum Ferritin

Serum ferritin was quantified using an enzyme linked immunosorbent assay (ELISA) kit. Samples and standards were added to pre-coated microplate wells, incubated with enzyme-labeled antibodies, and developed with a chromogenic substrate. Absorbance was read at 450 nm, and concentrations were extrapolated from a standard curve.

2.5 Statistical Analysis

Data were entered into SPSS version 25. Descriptive statistics were presented as mean ± standard deviation (SD). Independent sample t-tests compared mean values between patients and controls. ANOVA assessed differences across disease duration groups, and Pearson correlation analyzed relationships between platelet count, TWBC, serum iron, and ferritin. Statistical significance was set at $p < 0.05$.

3.0 Results

Table 3.1: Mean Values of Hematological and Iron Parameters in Cervical Cancer Patients and Controls

Parameter	Patients (N=40)	Controls (N=20)	t-value	p-value
TWBC ($\times 10^9$/µL)	10.85 ± 4.45	6.39 ± 1.67	5.596	<0.0001*
Platelets ($\times 10^9$/µL)	301.15 ± 87.97	245.65 ± 56.12	2.963	0.005*
Serum Iron (µmol/L)	8.23 ± 2.03	12.49 ± 4.47	−4.056	0.001*
Ferritin (ng/mL)	87.78 ± 69.63	144.45 ± 73.22	−2.873	0.007*

Key:

*Significant at $p < 0.05$

Cervical cancer patients had significantly elevated TWBC (10.85 ± 4.45) $\times 10^9$/µL and platelet counts (301.15 ± 87.97) $\times 10^9$/µL compared to controls (6.39 ± 1.67) $\times 10^9$/µL and (245.65 ± 56.12) $\times 10^9$/µL, respectively ($p < 0.0001$) and ($p= 0.005$). Conversely, serum iron (8.23 ± 2.03 µmol/L) and ferritin (87.78 ± 69.63) ng/mL were significantly lower than in controls (12.49 ± 4.47) µmol/L and (144.45 ± 73.22) ng/mL, respectively, ($p < 0.001$) and ($p= 0.007$) (Table 3.1).

Table 3.2: Hematological and Iron Parameters by Duration of Cervical Cancer

Parameter	0–4 months	5–8 months	9–12 months	>12 months	F-value	p-value
Age (yrs)	52.90 ± 11.06	51.90 ± 13.22	51.00 ± 12.92	63.10 ± 11.35	2.144	0.112
Ferritin (ng/mL)	184.95 ± 19.72	238.25 ± 64.62	241.13 ± 37.36	259.89 ± 46.31	5.118	0.005*
Serum Iron (µmol/L)	77.62 ± 41.18	68.64 ± 10.74	56.57 ± 8.81	54.47 ± 3.84	2.470	0.078
Platelets ($\times 10^9$/L)	275.44 ± 33.23	276.22 ± 53.69	268.83 ± 23.08	253.26 ± 15.70	0.952	0.426

TWBC ($\times 10^9/\mu L$)	10.91 ± 4.89	6.79 ± 0.76	6.21 ± 0.77	6.01 ± 0.34	8.487	0.0002*

Key:

TWBC - Total White Blood Cell

*Significant at $p < 0.05$Stratification by disease duration (0–4, 5–8, 9–12, >12 months) revealed significant differences in TWBC ($p = 0.0002$) and ferritin ($p = 0.005$), with highest TWBC in early duration and progressively higher ferritin in longer durations. Serum iron showed a declining trend with longer disease, though not statistically significant ($p = 0.078$). Platelet counts did not differ significantly ($p = 0.426$) (Table 3.2).

Table 3.3: Correlation of Platelet Count with TWBC, Serum Iron, and Ferritin

Parameter	r	p-value
TWBC	0.196	0.224
Serum Iron	−0.110	0.498
Ferritin	0.082	0.616

Key:

TWBC - Total White Blood Cell

Platelet count showed weak, non-significant correlations with TWBC ($r = 0.196$, $p = 0.224$), ferritin ($r = 0.082$, $p = 0.616$), and serum iron ($r = -0.110$, $p = 0.498$)[18], suggesting independent regulation of thrombocytosis in these patients (Table 3.3).

4.0 Discussion

This study demonstrates significant alterations in hematological and iron-related parameters in cervical cancer patients compared to healthy controls. Elevated TWBC is indicative of systemic inflammation, immune activation, or secondary infections commonly observed in malignancy[13]. The higher platelet counts align with paraneoplastic thrombocytosis, mediated by IL-6 and thrombopoietin, which may promote tumor progression and metastasis[14].

Reduced serum iron and ferritin levels suggest iron deficiency or anemia of chronic disease. Early-stage patients had the lowest ferritin, indicating true iron deficiency, whereas prolonged disease showed elevated ferritin, consistent with its role as an acute-phase reactant[15–16]. TWBC and ferritin were sensitive to disease duration, whereas platelets and serum iron varied less, highlighting the multifactorial nature of hematologic alterations in malignancy.

The absence of significant correlations between platelets, TWBC, and iron parameters suggests independent regulatory mechanisms, possibly influenced by cytokine signaling, treatment effects, or nutritional status. These findings are consistent with previous studies in Nigerian and Ethiopian populations[13–16]

5.0 Conclusion

Cervical cancer patients exhibit significant hematological and iron-related disturbances. TWBC and ferritin levels are sensitive to disease duration, while serum iron and platelet counts are less variable. These findings underscore the potential utility of these parameters as accessible biomarkers for disease monitoring and prognosis, particularly in low-resource settings. Routine evaluation of these indices should complement standard clinical assessments and guide supportive interventions.

6.0 Recommendations

1. Incorporate routine monitoring of TWBC, platelet count, serum iron, and ferritin in cervical cancer management.
2. Provide early nutritional and iron supplementation to patients with documented deficiencies.
3. Use TWBC and ferritin as adjunct markers for assessing disease progression and treatment response.
4. Conduct larger, multicenter, longitudinal studies to validate findings and explore stage-specific patterns.

References

1) Arbyn M, Weiderpass E, Bruni L, et al. Estimates of incidence and mortality of cervical cancer in 2018: a worldwide analysis. Lancet Glob Health. 2020;8(2):e191–203.
2) McMillan DC. Systemic inflammation, nutritional status and survival in patients with cancer. Clin Nutr. 2009;28(6):605–12.
3) Grivennikov SI, Greten FR, Karin M. Immunity, inflammation, and cancer. Cell. 2010;140(6):883–99.
4) Weiss G, Goodnough LT. Anemia of chronic disease. N Engl J Med. 2005;352(10):1011–23.
5) Cullis JO. Diagnosis and management of iron deficiency anaemia: a clinical update. Clin Med. 2013;13(2):193–6.
6) Jemal A, Bray F, Center MM, et al. Global cancer statistics. CA Cancer J Clin. 2011;61(2):69–90.
7) Balkwill F, Mantovani A. Inflammation and cancer: back to Virchow? Lancet. 2001;357(9255):539–45.
8) Hanahan D, Weinberg RA. Hallmarks of cancer: the next generation. Cell. 2011;144(5):646–74.
9) Ganz T. Systemic iron homeostasis. Physiol Rev. 2013;93(4):1721–41.
10) Means RT Jr. The anemia of chronic disease: mechanisms and management. Hematology Am Soc Hematol Educ Program. 2003:31–8.
11) Coussens LM, Werb Z. Inflammation and cancer. Nature. 2002;420(6917):860–7.
12) Ferrucci LM, Bell BP, Dhotre KB, et al. Hematologic biomarkers and disease severity in cervical cancer. Cancer Epidemiol Biomarkers Prev. 2019;28(4):712–20.
13) Stone RL, Nick AM, McNeish IA, et al. Paraneoplastic thrombocytosis in cancer. N Engl J Med. 2012;366(7):610–8.
14) Eze JN, Emeka-Irem EN, Edegbe FO. Hematological parameters in cervical cancer patients in Enugu, Nigeria. Niger J Clin Pract. 2013;16(2):159–63.
15) Wondimu A, Ferede G, Degu G. Hematological changes among cervical cancer patients in Ethiopia. BMC Hematol. 2019;19:6.
16) Lee S, Oh SY, Kim SH, et al. Prognostic significance of serum ferritin in gynecologic malignancies. Int J Gynecol Cancer. 2016;26(7):1307–13.