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**Some Haematological Parameters of Breast Cancer Patients accessing therapy at University of Calabar Teaching Hospital, Calabar Nigeria**

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Department of Surgery, University of Calabar, Calabar, Nigeria <sup>1</sup>, Department of Haematology and Blood Transfusion Science, University of Calabar, Calabar, Nigeria <sup>2</sup>.Author for Correspondence \*: [ecakwiwu@gmail.com](mailto:ecakwiwu@gmail.com)/ +234-803-677-7296/ORCID Number: 0000-0001-6097-557X. <https://dx.doi.org/10.4314/sjmls.v7i1.11>**Abstract**

Breast cancer contributes significantly to maternal mortality particularly in resource-poor settings with inadequate health infrastructure. Evaluation of haematological parameters is reliable for both diagnosis and monitoring of diseases. Thus, the present study was designed to investigate changes in packed cell volume (PCV), haemoglobin concentration (Hb), total and differential white cell counts as well as platelet count of breast cancer patients on treatment in Calabar, South- South, Nigeria. The study was conducted in University of Calabar Teaching Hospital, Calabar. It included 36 cases of pathologically diagnosed breast cancer (BC) female patients as well as 30 apparently healthy females drawn from the general population who served as control group. Ethical considerations and protocols were observed. Haematological parameters were analyzed on venous blood collected from each participant using the Sysmex KX-21N™ automated haematology analyzer system. Data analysis was carried on SPSS version 22.0 using students t-test and Pearson's correlation. A p-value of 0.05 was considered statistically significant. Haemoglobin concentration and packed cell volume mean values of Breast Cancer patients were significantly lower ( $p = 0.001$ ) compared to values from control subjects. Similarly, Breast Cancer patients had significantly lower values of the total white blood cell count as well as absolute neutrophil and lymphocyte counts compared to control subjects ( $p = 0.001$ ,  $p = 0.002$  and  $p = 0.007$  respectively). The stage of treatment course correlated negatively with monocyte count ( $p = 0.033$ ). In conclusion, this studied observed anaemia as well

as relative leucopenia among breast cancer patients on treatment.

**Key words:** Breast cancer, chemotherapy, haematological parameters, anaemia

**Introduction**

Cancer has long been recognized as abnormal and uncontrolled growth of cells in any part of the body. Cancer may be considered primarily a genetic disease at the cellular level because irreversible changes in the cellular hereditary material occur in the development of a cancer cell, but environmental and other factors may influence the probability of such changes (WHO, 2022; Azubuike *et al.*, 2018; Akpotuzor *et al.*, 2011). A heterogenous disease entity, cancer occurs in men, women and children with diverse incidence rates for different cancers (WHO, 2022). Breast cancer has been observed to be among the common cancers affecting women globally, and contributes significantly to maternal mortality (Olasehinde *et al.*, 2021; Fatiregun *et al.*, 2018). The implications of this with regards to maternal health and the attendant impact on family wellbeing call for better understanding and management of breast cancer. This is particularly of importance in our financially-constrained setting with inadequate health infrastructure and paucity of data (Akwiwu *et al.*, 2021; Ndem *et al.*, 2021; Akwiwu *et al.*, 2019; Ugochi *et al.*, 2018; Azubuike *et al.*, 2018).

Evaluation of haematological parameters is one of the reliable paraclinical methods to diagnose, evaluate and monitor diseases. Haematological

parameters can predict severity, mortality, and follow-up treatment in cancer (Guo *et al.*, 2019; Mouabbi *et al.*, 2017). Routinely assessed haematological parameters provide an overview of health status particularly with regards to anaemia, systemic immunological response as well as haemostatic involvement. However; there is paucity of information with regards to changes in haematological parameters in breast cancer patients in our locality. Consequently, the present study was designed to investigate changes in some haematological parameters of breast cancer patients on treatment in Calabar, South- South, Nigeria. This study focused on the packed cell volume (PCV), haemoglobin concentration (Hb), total and differential white cell counts as well as platelet count. The findings of this work would also reveal possible relationships between the measured parameters and treatment, which consists of surgical removal of tumour with follow up of chemotherapy.

**Materials and Methods**

The study was conducted in University of Calabar Teaching Hospital, Calabar. It included 36 cases of pathologically diagnosed breast cancer (BC) patients as well as 30 apparently healthy females drawn from the general population who served as control group. Ethical approval was obtained from the Health and Research Ethics Committee (HREC) of University of Calabar Teaching Hospital. Written informed consent was obtained from each participant enrolled in the research and confidentiality was maintained.

A volume of three milliliters (3mls) of blood sample was drawn from each subject in to EDTA sample bottle containing 1.5mg/ml for analysis of selected haematological parameters between the BC patients who are receiving adjuvant 5-fluorouracil, epirubicin, cyclophosphamide (FEC) chemotherapy and the control group. Haematological parameters were analyzed using the Sysmex KX-21N™ automated haematology analyzer system. The data obtained were analyzed in Statistical Package for Social Sciences (SPSS) using students t-test and Pearson's correlation at 95% confidence level with p-value of 0.05.

**Results**

Table 1 shows that haemoglobin concentration and packed cell volume mean values of Breast Cancer patients were significantly lower (p = 0.001) compared to values from control subjects. Similarly, Breast Cancer patients had significantly lower values of total white blood cell count as well as absolute neutrophil and lymphocyte counts compared to control subjects (p = 0.001, p = 0.002 and p = 0.007 respectively).

The studied population recorded participants at different stages of therapy as shown in Table 2. They ranged from the newly diagnosed ones (6%) to those on the sixth course of chemotherapy (19.5%). The stage of treatment course correlated negatively with monocyte count (p = 0.033) as shown in Figure 1.

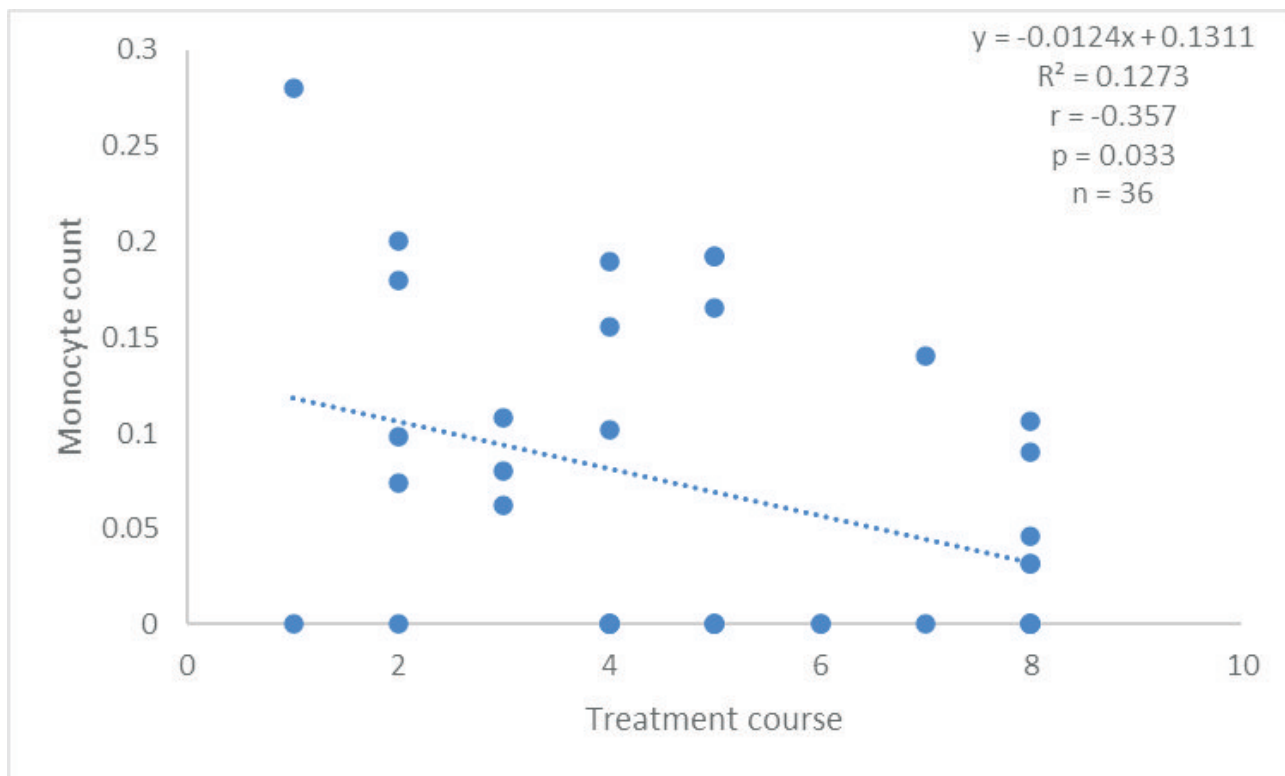
**Table 1: Haematological Parameters of Breast Cancer Patients and control group**

Parameters	BC patients n=36	Control group n=30	p-value
Hb g/l	98.72 ±6.25	120.30 ± 6.59	0.001
PCV l/l	0.31 ± 0.02	0.37 ±0.02	0.001
WBC x10 <sup>9</sup> /l	4.59± 1.26	6.04 ± 1.50	0.001
Platelet 10 <sup>9</sup> /l	210.42 ± 37.81	226.77 ±52.77	0.148
Neutrophil 10 <sup>9</sup> /l	2.17 ±0.99	2.97 ±1.05	0.002
Lymphocyte 10 <sup>9</sup> /l	2.32±0.99	2.97 ±0.87	0.007
Monocyte 10 <sup>9</sup> /l	0.07 ±0.01	0.08 ±0.01	0.786
Eosinophil 10 <sup>9</sup> /l	0.2± 0.01	0.3 ±0.01	0.700

**Key:** BC = Breast cancer, Hb = haemoglobin concentration, PCV = packed cell volume, WBC = white blood cell.

**Table 2: Frequency of the enrolled Breast Cancer Patients at different stages of treatment**

Stage in Treatment	Number	Approximated Percent
	<b>n = 36</b>	<b>100%</b>
Yet to undergo surgery and chemotherapy	2	6.0
Yet to commence chemotherapy	4	11.0
First course of chemotherapy	4	11.0
Second course of chemotherapy	7	19.5
Third course of chemotherapy	6	17.0
Fourth course of chemotherapy	3	8.0
Fifth course of chemotherapy	3	8.0
Sixth course of chemotherapy	7	19.5



**Figure 1. Correlations between stage of treatment course and monocyte count**

## Discussion

The present study considered haematological parameters in Breast Cancer patients attending University of Calabar Teaching Hospital, Calabar in Cross River State of Nigeria. Apart from being significantly lower than values from the control group, haemoglobin concentration and packed cell volume of Breast Cancer patients were observed to be decreased beyond reference cut-off values for non-pregnant adult females (120g/l and 0.36l/l for haemoglobin concentration and packed cell volume respectively). Our finding is consistent with a previous report (Erhabor *et al.*, 2018) among breast cancer patients in Sokoto North Western Nigeria which indicated that patients with breast cancer had a lower mean packed cell volume ( $29.20 \pm 0.50$  %) compared to controls ( $36.20 \pm 0.42$  %) ( $p=0.000$ ). The finding of anaemia is reportedly among the basic challenges in the management of cancer patients. Attributed to possible diverse underlying mechanisms, the pathophysiology of cancer-related anaemia continues to dominate research discourse in oncology. Bone marrow suppression leading to reduced erythropoietic activity, iron sequestration, blood loss from the anatomical site of surgical intervention and general lack of appetite associated with cancer contribute to anaemia in cancer (Kifle *et al.*, 2019; Ibrahim *et al.*, 2016). In view of the foregoing, there could also be combination of factors at play.

There was also a finding of significantly lower values of the total white blood cell count as well as absolute neutrophil and lymphocyte counts among the enrolled Breast Cancer subjects. Our finding is consistent with a previous report (Erhabor *et al.*, 2018) among a cohort of Breast Cancer women in Sokoto North western Nigeria which indicated that the mean total white blood cell count of breast cancer patients was significantly lower ( $3.91 \pm 0.19 \times 10^9 /l$ ) compared to controls ( $4.38 \pm 0.13 \times 10^9 /l$ ) ( $p=0.045$ ). Total white blood cell count and its sub-populations are known to be cellular markers of inflammation; however, lower values have been associated with immunosuppression and cancer treatment (Steele, 2012). Leucopenia among breast cancer patients on chemotherapy is thought to arise from drug interruption of normal haemopoiesis. Analysis of correlation between the measured parameters and stage of therapy revealed that progress in treatment witnessed

downward turnout of absolute monocyte count among the study participants. The involvement of monocyte in cancer development has been thought to be an expression of innate immunity that induces chemotaxis of monocytes and tissue macrophages to tumour site. Their incorporation into the tumour microenvironment is also thought to facilitate metastasis, and in fact, increase in absolute monocyte count has been found to be associated with poor prognosis in preoperative breast cancer (Wen *et al.*, 2015). The finding of a decline in absolute monocyte count as treatment progressed is thus suggestive of effective therapy in the management of the studied population. In conclusion, this study observed anaemia as seen in lower haemoglobin concentration and packed cell volume among breast cancer patients. Apart from relative leucopenia, the absolute monocyte count was observed to reduce as treatment progresses.

## Conflict of interest

All Authors declare no conflict of interest

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