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Original article

Haematological Parameters in Female Breast Cancer Patients in South Western Nigeria

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ABSTRACT

This is a cross sectional study of age and variations of Haematological parameters among female breast cancer patients and apparently healthy individuals in South western Nigeria.. Eighty eight breast cancer patients from Ladoke Akintola University Teaching Hospital and Abake Medical centre in Osogbo, Osun State were studied between July and November, 2011. Questionnaires for bio data were administered to both the patients (cases) and control subjects. Haematological parameters were run on the EDTA samples for packed cell volume (PCV), white cell count (WBC), red cell indices (MCV, MCH, MCHC), RBC count, platelet count, using automated machine (Sysmex KX-21N, Kobe Japan 2003). Erythrocyte sedimentation rate (ESR) was also performed on the sodium citrate samples using the Western green method. Significant differences ($p < 0.05$) were seen in the values for WBC, RBC, HB, PCV but not for ESR ($p > 0.05$) among controls below and above age 40 years. The HB, PCV, RBC and WBC and the absolute platelet count were lower in patients compared to the controls with statistically significant differences ($p<0.05$). However, the mean ESR value significantly higher than the control subjects ($p < 0.05$). This study has shown that age, anaemia; leucopenia and thrombocytopenia were common basic features to be considered in breast cancer patients and erythropoiesis-related parameters are lower in the older patients.

KEYWORDS: Age, haematological parameters, females, breast cancer, Nigeria

INTRODUCTION

Cancer is a major public health problem in Nigeria, the United States and many other parts of the world. Currently, one in four deaths in the United States is due to cancer According to the American Cancer Society, 7.6 million people died from cancer World-wide in 2007[1]. Anemia is a complication commonly observed in patients with cancer, this can be caused by bleeding, nutritional deficiencies, bone marrow damage, tumor infiltration in bone marrow, and the malignant process itself. The inflammatory cytokines associated with tumor genesis, such as tumor necrosis factor-α (TNF-α) and interleukin-1 (IL-1), can inhibit the proliferation of erythrocytic progenitors [2].

Breast cancer incidence appears to be on the increase in Nigeria, large number of the patients appear to present lately thus with high tendency of presenting with anaemia and its consequences. Anemia is present in many patients with cancer at the time of diagnosis or as a result of chemotherapy [2]. This is usually termed "anemia of chronic diseases," and the three categories of diseases associated with it are infection, inflammation, and neoplasia. Changes in the pattern of iron distribution are characteristic of this kind of anemia [3, 4, 5].

Haematological indices in cancer patients at presentation have been evaluated in very few studies, examples are that of den Ouden [6] on ovarian cancer and Madu [7] on breast cancer. Breast cancer also tends to occur more in younger patients among blacks compare to the Caucasians, these tends to be more aggressive and portends worse prognosis. The haematological parameters might be similarly affected. This study therefore aimed at evaluating the haematological status of our female breast cancer patients both old and young with a view to helping in cancer counselling and diagnosis for an improved management and life style of the patients.

MATERIALS AND METHODS

A cross-sectional study of some haematological parameters of both old and young breast cancer patients in two hospitals in Osogbo were studied along with that of similarly matched healthy individuals as control.

Subjects Selection: Eighty eight female breast cancer patients from Ladoke Akintola University Teaching Hospital and Abake medical center in Osogbo Osun state, Nigeria who gave their consent were recruited between July and November, 2011. Eighty eight apparently healthy individual volunteers of the same age bracket who served as controls were also recruited. Five millilitres of venous blood was collected from each patient and control with 3.0 ml dispensed into EDTA bottle while 2.0 ml was dispensed into 0.5 ml sodium citrate vials for the erythrocyte sedimentation rate estimation. Other tests were performed on the EDTA samples viz packed cell volume (PCV), haemoglobin, White blood cell count, red cell indices (MCV, MCH, MCHC), red cell count, platelet count, using automated machine (Sysmex KX-21N).

Haematological Analysis Using Automation: Sysmex KX – 21N (sysmex corporation, Kobe, Japan) [8]., a quantitative automated haematology analyzer for in-vitro diagnostic was used in determining 19 haematological parameters. It directly measure the WBC, RBC, haemoglobin, haematocrit, platelets, Absolute lymphocytes count, Absolute mixed count and Absolute Neutrophil count while the remaining parameters are calculated or derived; Mean cell volume (MCV), mean cell haemoglobin (MCH), mean cell haemoglobin concentration (MCHC), red cell distribution weight etc. The tests were done as directed in the manual. ***Erythrocyte Sedimentation Rate (ESR)*** was determined by standard (Westergren) method [9].

Statistical Analysis: The data obtained were statistically analyzed using Student't' test to compare the data from the breast cancer patients and the control subjects using SPSS software version 16. The results were expressed as mean ± standard deviation with $p<0.05$ denoting significant difference between groups.

RESULTS

Results of haematological parameters obtained from eighty-eight female breast cancer patients are as shown in table 1 and 2. The mean red blood cell count, Packed cell volume, haemoglobin and white blood cell count were significantly lower in the studied population than their control counterparts ($p <0.05$) as reflected in table 1. On the other hand, the mean ESR values of the breast cancer patients were significantly higher than the control subjects ($p < 0.05$). Also the mean total lymphocytes value of test group (42.23±13.498) was lower than that of the control groups (46.58±6.652) and the mean difference was however not statistically significant ($p>0.05$). The absolute platelet count and the Mean corpuscular haemoglobin are also lower though not significantly in the cancer group [Table 1].

Table 1: Haematological parameters of female breast cancer patients and control subjects.

TEST	PATIENTS	CONTROLS	P-VALUE
ESR mm/hr	20.95 ±19.014	6.57 ±1.913	0.000
WBC $X10^3/\mu L$	3.6 ± 1.150	5.42 ±1.357	0.009
RBC $x10^6/\mu L$	3.80 ±0.798	4.79 ±0.605	0.000
Haemoglobin concentration (g/dl)	9.63 ±2.273	14.22± 5.849	0.000
Packed cell volume (%)	31.20± 6.632	43.78± 4.362	0.000
MCV (fL)	82.29 ±5.755	81.21± 4.003	0.010
MCH (pg)	25.30± 2.470	26.58± 1.809	0.157
MCHC (g/dL)	30.50± 2.236	32.89 ±1.602	0.000
Platelets $X10^3/\mu L$	170.27 ±132.595	208.18 ±87.898	0.997
Lymphocytes (%)	42.23 ±13.498	49.58 ±6.652	0.103
Mixed/unclassified cells population(%)	7.26 ±3.046	6.35± 4.279	0.222
Neutrophils (%)	54.97± 13.825	47.10 ±7.271	0.005

*Values expressed as Mean±SD, P value <0.05 was considered as significant.

The mean value ESR in ages <40 years (22.00±20.919) and above 40 years (21.00±17.038) shows no significant difference ($p>0.05$). No significant differences in the mean for total WBC, MCV, lymphocyte and platelet counts for both age groups. However, the mean RBC count in ages <40 years (4.18±0.596) and above 40 years (3.33±0.823) were significantly different as well as both the Mean Corpuscular Haemoglobin and the Haemoglobin concentration [Table 2].

Table 2: Age distribution of haematological parameters in female breast cancer patients.

PARAMETER	≤40Years (n=39)	>40Years (n=49)	P-VALUE
ESR mm/hr	22.00 ±20.919	21.00 ±17.038	0.372
WBC $X10^3/\mu L$	3.53 ±1.556	4.43± 2.383	0.049
RBC $x10^6/\mu L$	4.18 ±0.596	3.33± 0.823	0.000
Haemoglobin concentration (g/dl	10.62± 1.683	8.19 ±2.326	0.000
Haematocrit (%)	34.17 ±4.995	27.13± 6.828	0.000
MCV/fl	81.88± 4.914	82.07± 6.646	0.046
MCH/pg	25.58 ±2.323	24.50 ±2.363	0.001
MCHC g/dl	30.77 ±1.687	29.92± 2.777	0.041
Platelets $X\ 10^3/\mu L$	200.83 ±51.591	233.56± 192.898	0.053
Lymphocytes (%)	41.60 ±12.489	43.58± 15.447	0.632
Mixed/unclassified cells population (%)	6.38± 2.867	7.86 ±2.775	0.000
Neutrophils (%)	54.20± 12.188	56.53 ±16.420	0.581

*Values expressed as Mean±SD, P value <0.05 was considered as significant.

DISCUSSION AND CONCLUSION

Complete blood picture is a routine test which is used frequently by clinicians to support the working diagnosis of several diseases, such as anemias, acute infections, hemorrhagic states, allergic disorders, cancers, and immune disorders, health screening and pre-operative evaluations. In this study, anaemia (as indicated by low haematocrit and haemoglobin concentration levels) was established in the breast cancer patients studied as well as leucopoenia and thrombocytopenia [Table 1]. This observation is corroborated by a report [10] in which significantly low concentrations of haemoglobin and significantly reduced haematocrit, total white blood cell and platelet count values in pre- and post- surgery breast cancer patients were reported from Enugu in Nigeria.

Result of this present study also conforms to that obtained in experimental animals developed anaemia after inoculation with experimental tumor models [2]. Since the decrease in various haematological parameters could not be linked with socio-economic background and diet intake of the breast cancer patients as described in some previous studies, the anaemia could be due to increased levels of pro-inflammatory cytokines, such as IL-1, IL-6, TNF-α, and INF-δ, that induce iron retention by the reticulo-endothelial system, gastrointestinal tract, and liver, thereby exerting an inhibitory effect on erythroid precursors [11].

Age relationship in the breast cancer patients as observed in this study shows that patients above 40 years have significantly reduced ($p<0.05$) red cells count and haemoglobin concentration as compared to the healthy individuals. Could this be due to the fact that these parameters tend to reduce after the fifth decade? [12, 13] or the presence of cancer with associated immunosupression and bone marrow suppression as well. The later may not hold since breast cancer tends to be more aggressive in the younger patients.

Our study shows that haematological parameters are reduced in the breast cancer patients aged above 40 compared to those below 40 years with few exceptions. This trend is similar to the results obtained by Ulrich research group [12] when with the exception of platelet and neutrophil counts, haematological values tend to be higher in men especially in the younger age groups, and decreased continuously with increasing age. The most obvious age-dependent changes were observed to be for the erythropoiesis-related parameters; haemoglobin and haematocrit levels were observed to decline in both sexes, though more pronounced in the females.

In conclusion, this study has shown that anaemia; leucopenia and thrombocytopenia and high ESR were common features to be considered in breast cancer patients which could be useful tools in diagnosis and monitoring treatment. Erythropoiesis-related parameters are lower in older female breast cancer patients.

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