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Assessment of Blood Transfusion needs for Breast Cancer Patients receiving Chemotherapy at University of Calabar Teaching Hospital, Calabar

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ABSTRACT

Introduction: Haematological derangements are commonly reported in breast cancer patients. These abnormalities can manifest both before and during cancer treatment. Depending on the degree of reduction in cellular elements of blood, blood transfusion is often required to correct severe situations. Different regions of the world as well as local settings have peculiar patterns regarding transfusion needs.

Methods: This cross-sectional study adopted purposive sampling technique to enroll 55 breast cancer patients who were accessing chemotherapy at the University of Calabar Teaching Hospital in Calabar, Southern Nigeria. The ABO and Rhesus grouping were carried out by standard tube method. Blood transfusion requests were followed up at the Blood Transfusion Services section of Haematology Laboratory of the Hospital.

Results: Those with blood group O were 61.8% followed by blood group A which recorded 21.8%, while blood group B was 16.4%. None of the subjects belonged to blood group AB. All the participants were Rhesus 'D' positive. Out of the 55 enrolled subjects, 37 of them which constituted 67.3% received whole blood transfusion during this study, while 18 of them making up 32.7% were not transfused. The indications for transfusion among the transfused ones showed that majority (62%) of the transfused persons had cytopenia while those who had anaemia alone were 38%. The extent of blood cell deficit varied among transfused subjects. Consequently, some of the subjects received single transfusion, while others received multiple transfusion to enable them receive the chemotherapy dose. Transfusion of 2 units ranked highest as received by 41%, followed closely by 1 unit transfusion for 35% of the subjects.

Conclusion: Blood transfusion needs for breast cancer patients receiving chemotherapy was mainly within two units of blood.

Keywords: Breast cancer, chemotherapy, blood group, blood transfusion.

INTRODUCTION

Malignant proliferation of breast tissue cells is a condition associated with high morbidity and mortality. Early detection and timely treatment have been identified as crucial factors for survival, particularly in developing regions where cancer awareness is still low (1-4). Significant disparities in breast-cancer estimated prevalence and specific outcomes exist across different regions of the world. While fewer women have the opportunity for diagnosis in low human development index (HDI) regions compared

to those in high HDI areas, the former are at greater risk of mortality than the latter (5). Breast cancer occurs predominantly in females and thus represents a critical aspect of maternal health. Unfortunately, vulnerability of women with regards to health appears to be much more widespread in Nigeria, and deserves urgent attention (6-8).

Haematological derangements are commonly reported in breast cancer patients. These abnormalities can manifest both before and during cancer treatment. Prior to treatment initiation, the suppression of hematopoiesis due to bone marrow infiltration predominantly drives haematological complications. Various studies corroborate the common occurrence of anaemia, neutropenia, and thrombocytopenia prior to treatment in breast cancer patients (9-12). Conversely, post-treatment haematological irregularities can be attributed not only to the malignancy itself, but also to the impact of chemotherapeutic medications administered to patients (13).

A previous investigation in the study area also reported blood cell deficits in the management of breast cancer (14). More importantly, these deficits constitute part of the indices in monitoring disease progression and effective therapy. They are caused by both the disease mechanisms as well as adverse effects from chemotherapeutic agents (15,16). Among these haematological aberrations, anaemia emerges as the most prevalent in breast cancer patients (17). Mechanisms underlying its development encompass tumor-induced bleeding, tumor infiltration of bone marrow, tumor-induced malnutrition, disruptions in iron metabolism, impairment of renal function, and compromised bone marrow performance (18). On a related note, leucopenia is primarily tied to medications causing myelosuppression (19). In cases of low platelet counts associated with breast cancer, frequent activation of the coagulation system by cancer cells can lead to thrombocytopenia. Furthermore, it has been observed that thrombocytosis has been linked to poorer progression-free survival rates (20). Depending on the degree of reduction in cellular elements of blood, blood transfusion is often required to correct severe situations. Although management of breast cancer may require blood transfusion therapy, different regions of the world as well as local settings have peculiar patterns regarding transfusion needs. However, this aspect of the management of breast cancer is yet to be evaluated and reported from our locality. There is, therefore, need to look into blood transfusion supportive care rendered to breast cancer patients in this part of the globe.

MATERIALS AND METHODS

This cross-sectional study adopted purposive sampling technique to enroll 55 breast cancer patients who were accessing chemotherapy at the University of Calabar Teaching Hospital in Calabar, Cross River State of Nigeria. The study participants were all adult females. Ethical approval was duly sought and obtained from The Ethics and Health Research Committee of the hospital. Informed consent was obtained from each study participant.

The ABO and Rhesus groupings were carried out by standard tube method. Blood transfusion requests were followed up at the Blood Transfusion Services section of Haematology Laboratory of the Hospital.

RESULTS

This research was carried out to assess blood transfusion needs for breast cancer subjects on chemotherapy. The study recruited breast cancer patients attending clinic at the University of Calabar Teaching Hospital, Calabar. Distribution of the ABO and Rhesus blood groups followed the patterns of blood group O and Rhesus 'D' positive dominance as shown in Table 1. Those with blood group O were 61.8% followed by blood group A which recorded 21.8%, while blood group B was 16.4%. None of the subjects belonged to blood group AB. All the participants were Rhesus 'D' positive. Out of the 55 enrolled subjects, 37 of them which constituted 67.3% received whole blood transfusion during this study, while 18 of them making up 32.7% were not transfused (Table 1).

The indications for transfusion among the transfused ones were also recorded. Majority (62%) of the transfused persons had cytopenia while those who had anaemia alone were 38% (Figure 1). For the 18 persons that were not transfused, 39% of the had leucopenia and were placed on granulocyte colony-stimulating factor (filgrastim) injection. The remaining 61% of them had no need for blood transfusion nor haemopoietic-stimulating agents (Figure 2). The extent of blood cell deficit varied among transfused subjects. consequently, some of the subjects received single transfusion, while others received multiple transfusion to enable them receive the chemotherapy dose. Transfusion of 2 units ranked highest as received by 41%, followed closely by 1 unit transfusion for 35% of the subjects. Three (3) units and 4 units transfusion constituted 8% and 16% respectively (Figure 3).

Table 1. Blood group and transfusion status of the Breast Cancer Patients

Parameter	Number	Frequency
	n = 55	(%)
ABO Blood Group		
A	12	21.8
B	9	16.4
AB	0	0
O	34	61.8
Rhesus 'D' Grouping		
Positive	55	100
Negative	0	0
Transfusion status		
Transfused	37	67.3
Not transfused	18	32.7

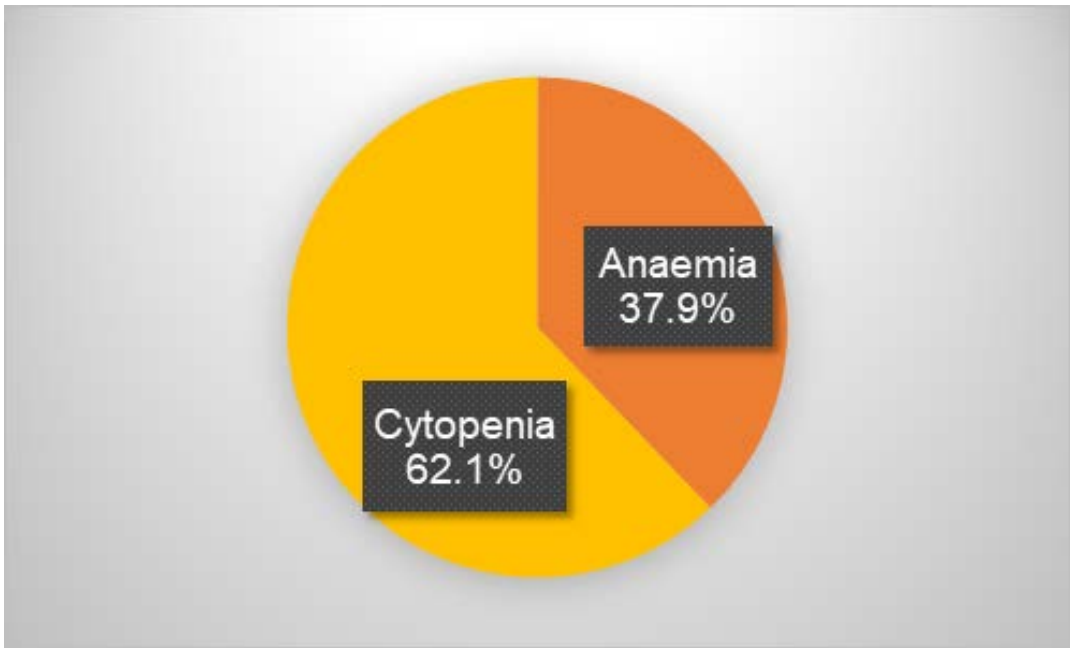

FIG 1. Indications for blood transfusion for the Breast Cancer Patients

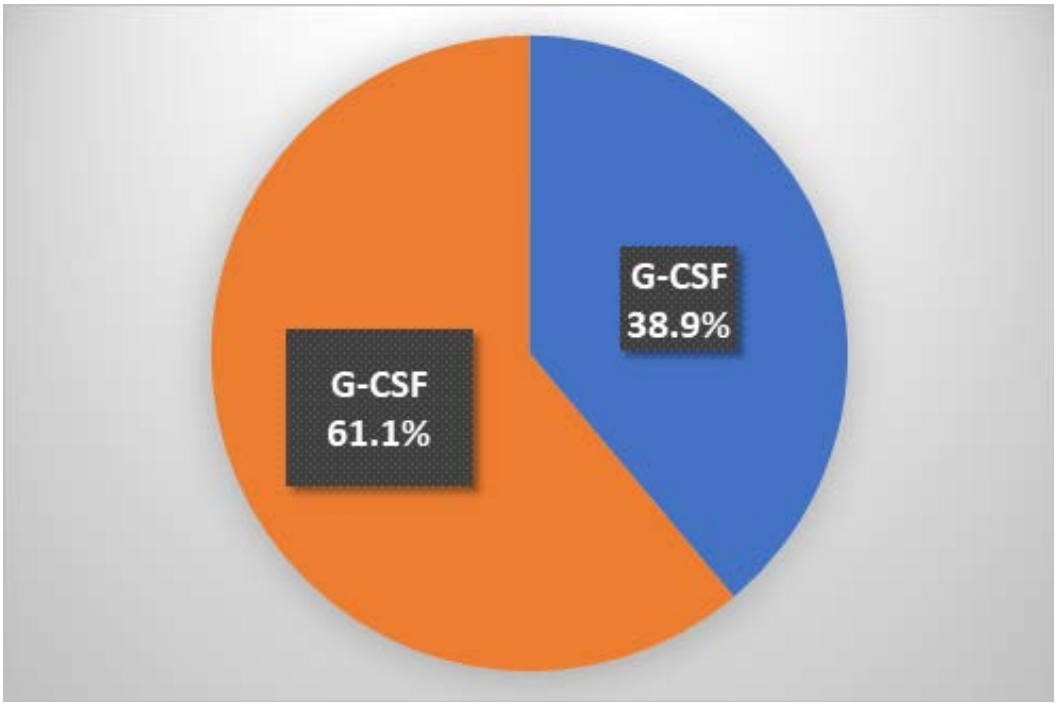

Fig 2. Proportion of non-transfused Breast Cancer Patients on stimulating agents

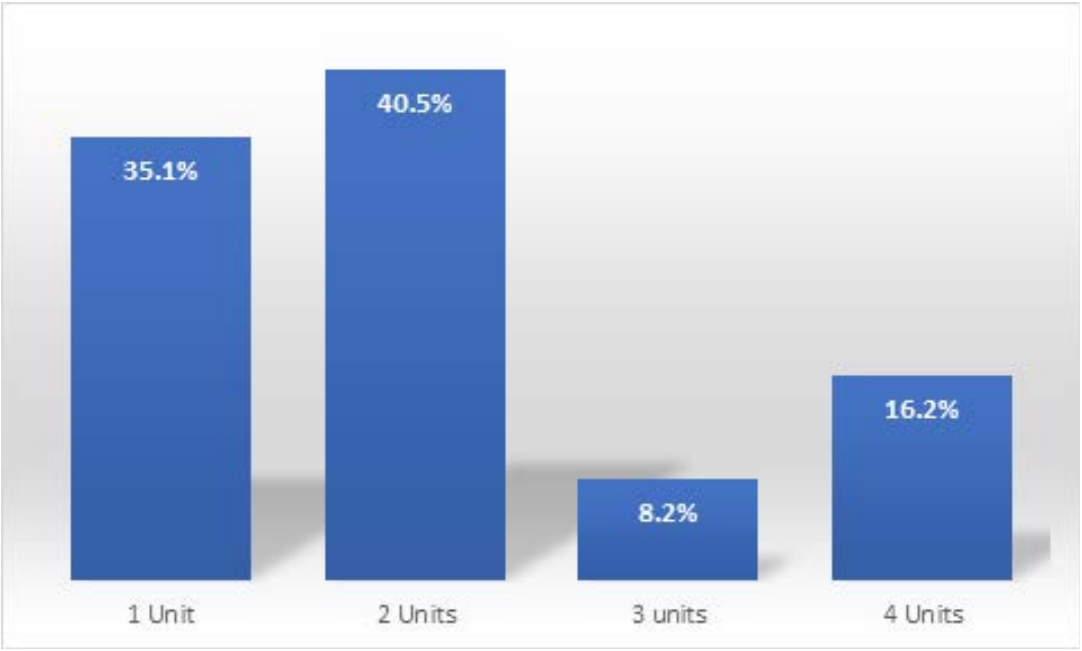

Fig. 3. Number of blood units received to correct blood cell deficit

DISCUSSION

Disproportionate distribution of health challenges across the world requires deliberate effort at investigating identified conditions in our various localities. Such records would reveal peculiarities necessary for region-based health policies and intervention strategies (21,22). This research was carried out to assess blood transfusion needs during breast cancer chemotherapy at the University of Calabar Teaching Hospital, Calabar in Southern Nigeria. All the study participants were adult females. Two thirds of the breast cancer subjects required blood transfusion following pre-chemotherapy review. The main indication for blood transfusion for these subjects was pancytopenia (62%), while 38% had anaemia alone. Chemotherapy which is useful in eradicating cancer cells towards patient cure, prolongation of survival, and alleviation of symptoms caused by the disease applies to breast cancer management. However, chemotherapy affects all rapidly dividing cells, including haematopoietic progenitor cells. This can manifest in the decrease of all blood cell lines known as pancytopenia or affect specific cell lines resulting in anaemia, leucopenia or thrombocytopenia. Another possible mechanism for chemotherapy-induced anaemia is thought to be the occurrence of eryptosis. In a process comparable to apoptosis of nucleated cells, defective erythrocytes are eliminated. Eryptosis and resultant erythrocyte deficiency contributes to anemia and is exacerbated by inadequate compensatory erythropoiesis. Whatever the case may be, blood cell deficit can compromise the success of chemotherapy with an attendant increased mortality risk (23-25).

Blood cell deficits, particularly anaemia, remain common toxicities associated with chemotherapy during curative breast cancer treatment. Correction of anaemia contributes to delay in treatment and increased cost (26-30). In relation to the extent of the anemia, there are several treatment options including blood transfusion (31,32). The study observed that subject with only leucopenia were rather administered with granulocyte colony-stimulating factor (filgrastim) injection. Granulocyte formation is controlled by hematopoietic growth factors such as granulocyte colony-stimulating factor (G-CSF) or granulocyte/macrophage colony-stimulating factor (GM-CSF), which are released into the bloodstream as the granulocyte concentration decreases to stimulate proliferation or differentiation of progenitor cells. The prophylactic administration of recombinant G-CSF preparations such as filgrastim accelerates the regeneration of protective granulocyte cell counts after myelosuppressive chemotherapy. (33,34). Interestingly, some subjects (11 out of 55) had no need for blood transfusion nor haemopoietic-stimulating agents up to the time of the study. In general, the ABO and Rhesus blood groups of the studied population followed the patterns of blood group O and Rhesus 'D' positive dominance which is comparable to the general population across Nigeria (35-37). Thus, there were no special needs with regards to blood types for those requiring transfusion therapy. The extent of blood cell deficit varied among transfused subjects. Consequently, blood transfusion needs spanned through varying numbers of blood units. The number of blood units required was mainly within two units.

CONCLUSION

Distribution of the ABO and Rhesus blood groups followed the patterns of blood group O and Rhesus 'D' positive dominance. Two thirds of the breast cancer subjects required blood transfusion following pre-chemotherapy review. The main indication for blood transfusion for these subjects was pancytopenia, while a lesser proportion had anaemia alone. Blood transfusion needs spanned through varying numbers of blood units but was mainly within two units of blood.

Conflict of Interest

The authors declare no conflict of interest.

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