

## PROGNOSTIC SIGNIFICANCE OF COMPLETE BLOOD COUNT IN BREAST CANCER PATIENTS

Preeti Chauhan, Dr. Ritu Yadav\*, Vivek Kaushal, Preeti Beniwal

\*Department of Genetics, M.D. University, Rohtak-124001

Department of Radiotherapy, Pt. B.D. Sharma University of Health Science, Rohtak

### Keywords:

Breast cancer, complete blood count, chemotherapy, prognostic significance.

### Abstract

**Objective:** Breast carcinoma is the most common cancer worldwide. The incidence and mortality rate is increasing in developing countries as compare to developed countries. The aim of this study was to assess complete blood count of the breast cancer patients to determine their prognostic values during the different courses of chemotherapy treatment.

**Methods:** In the present study, two hundred breast cancer patients were selected to study prognostic significance of peripheral blood of breast cancer patients.

**Results:** The mean age of breast cancer patients was  $47.49 \pm 10.43$ . A decrease in mean value of Hb concentration was observed from  $12 \text{g/dl} \pm 1.45$  to  $10.9 \text{g/dl} \pm 1.54$ . Platelet count was observed to be increased as the treatment proceeds from first chemotherapy to fifth course of chemotherapy. A decreased pattern of number of total leukocyte and lymphocyte count was noted during chemotherapy treatment. No significant variation was observed for neutrophils, Eosinophil and monocyte count during the different courses of chemotherapy treatment.

**Conclusion:** In conclusion, present results suggest the prognostic significance of the complete blood cell count in the disease monitoring and metastasis.

### Introduction

Breast cancer is the common malignancy and leading cause of death in women worldwide<sup>[1]</sup>. Breast cancer is heterogeneous in its clinical, genetic and biochemical profile. The breast cancer incidence rate is much lower in Asian countries as compare to western countries. The cancer incidence is increasing in all regions of the world with majority of rise seen in developing countries<sup>[2]</sup>.

The complete blood count is a prerequisite investigation for breast cancer patients before the use of any treatment<sup>[3]</sup>. The breast cancer treatments like chemotherapy and radiation therapy generally destroy the cancerous cells in the body. However, some of the normal cells are also sensitive to these treatments and get damage in the process. Some cancer treatments interfere with blood cells production in the body. Complete blood counts are routinely performed during chemotherapy and other breast cancer treatments to check the number of each type of blood cell circulating in the body. The complete blood count also helps to check for different side effects of chemotherapy.

The complete blood count (CBC) measures the levels of the three basic blood cells: red blood cells, white blood cells, and platelets. Blood counts are monitored regularly before each cycle of treatment in breast cancer patients, since cancer treatments affect the bone marrow's ability to make blood cells. Chemotherapy medications and radiation exposure can significantly reduce the levels of blood cells. This reduction increases the risk of infection, fatigue and bleeding.

Complete blood count especially lymphocytic count reflects the response of cellular immunity in a cancer patient. The alteration in hematological parameters influences the disease progression. Hemoglobin (Hb) and packed cell

volume (PCV) are indirectly associated with increased risk of cardiac failure in cancer patients [4]. Total leucocytic count (TLC), if elevated, predicts poorer prognosis [5]. The white blood cell count (total and differentials) and platelet count predicts disease severity and mortality risk [6]. In the present study, complete blood count was studied in order to determine their diagnostic and prognostic values during the different courses of chemotherapy.

## Material And Methods

The present study was conducted on the two hundred breast cancer patients being treated at Pt. B.D. Sharma University of Health and Sciences (PGIMS), Rohtak, Haryana. Blood analysis of two hundred female breast cancer patients undergoing chemotherapy was performed. All samples were taken after institutional ethical committee permissions and personal consent of the patients or guardians reg no. (PHY/13/1009/12.11.13)

The blood samples were collected from the patients; in heparinized tubes. The collected samples were analysed for prognostic significance of peripheral blood. The different parameters like Hemoglobin (Hb) concentration, Total leukocyte count, Differential leukocyte count and blood platelet count were included in this study. The statistical analyses were done by Microsoft Excel Windows 10.

## Results

In the present study, two hundred breast cancer patients were studied for prognostic significance of peripheral blood. The mean age of breast cancer patients was  $47.49 \pm 10.43$ . Maximum patients were from rural background (66%) with no education (76%).

Hemoglobin (Hb) concentration was noted in breast cancer patients. Hemoglobin count was found to be in range of 9-14g/dl. The mean of hemoglobin level was  $12\text{g/dl} \pm 1.45$  before the start of chemotherapy and  $10.9\text{g/dl} \pm 1.54$  during the course of chemotherapy. The level of hemoglobin falls as the number of courses of chemotherapy proceeds. This may cause the risk of anemia in the breast cancer patients (Figure 1).

Total leukocyte count was found with 8000-10,000 cells/ $\mu\text{l}$  in majority of patients before the start of chemotherapy. It was observed that majority of patients had Total leukocyte count ranged from 6,000-10,000 cells/ $\mu\text{l}$  during the different courses of chemotherapy (C1-C5) (Figure 2). The platelet count of peripheral blood has an important diagnostic significance. Majority of patients were found with 3-4 lakhs/ml before chemotherapy treatment. Platelet count was observed to be increased as the treatment proceeds from first chemotherapy to fifth course chemotherapy. Increased platelet count was found to be associated with breast tumor progression (Figure 3).

Differential leukocyte count was observed  $5-6 \times 10^9/\text{l}$  neutrophils in maximum number of patients before the start of courses of chemotherapy. During the chemotherapy, neutrophils count was found  $4-6 \times 10^9/\text{l}$  among maximum breast cancer patients. No significant variation was observed for neutrophils count during the chemotherapy treatment (Figure 4).

Total lymphocyte count was noted as  $3.0$  to  $3.5 \times 10^9/\text{l}$  in majority of patients before chemotherapy. A decreased pattern of number of lymphocytes was noted from first course of chemotherapy to fifth course of chemotherapy. Reduced amount of lymphocyte was also associated with breast cancer progression (Figure 5).

Eosinophil showed no significant variation during the different courses of chemotherapy. Eosinophil were found to be  $0.3$  to  $0.4 \times 10^9/\text{l}$  in maximum number of patients before the chemotherapy (Figure 6). In maximum number of breast cancer patients, monocytes count was found to be  $0.6-0.7 \times 10^9/\text{l}$  before chemotherapy. However, no significant variation was observed during the course of first to fifth chemotherapy (Figure 7).

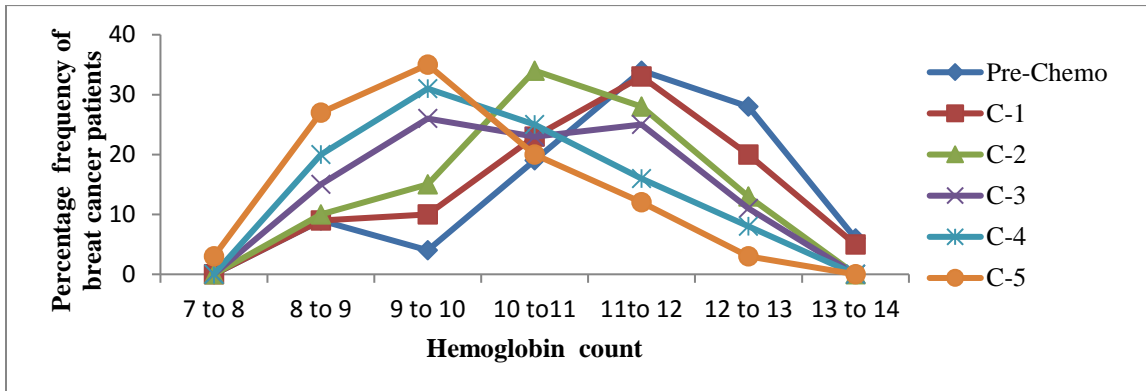


Figure 1: Distribution of hemoglobin concentration of breast cancer patients during five courses of chemotherapy.

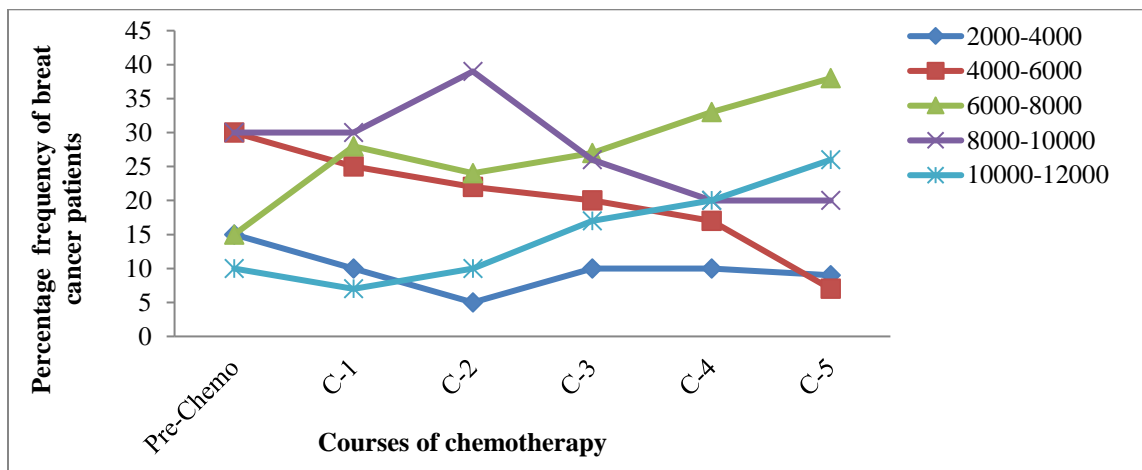


Figure 2: Variation of total leukocyte count among breast cancer patients during five courses of chemotherapy.

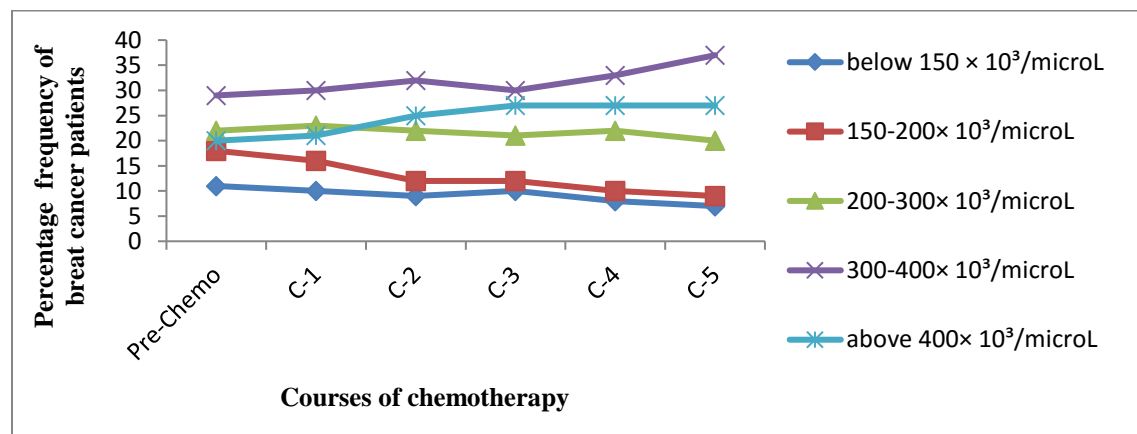


Figure 3: Variations of blood platelet count of breast cancer patients during five courses of chemotherapy.

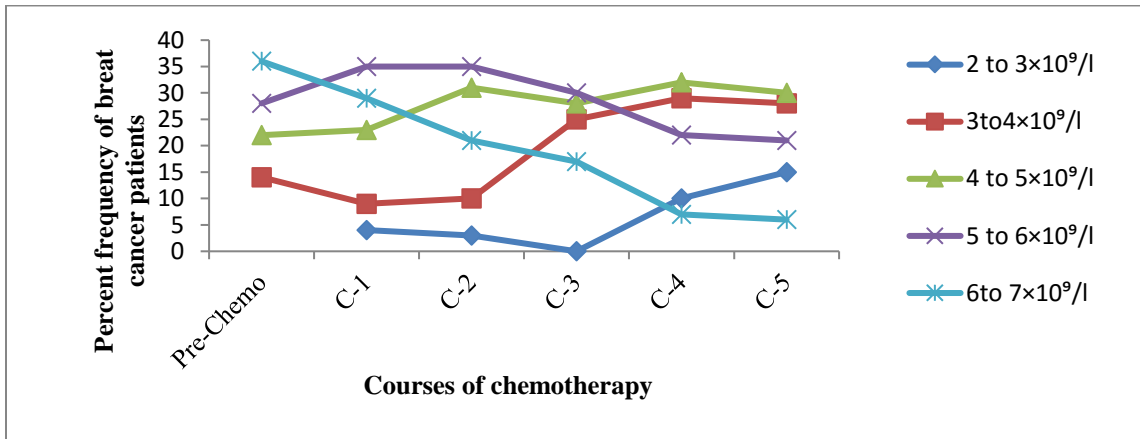


Figure 4: Variations of blood neutrophils count of breast cancer patients during five courses of chemotherapy.

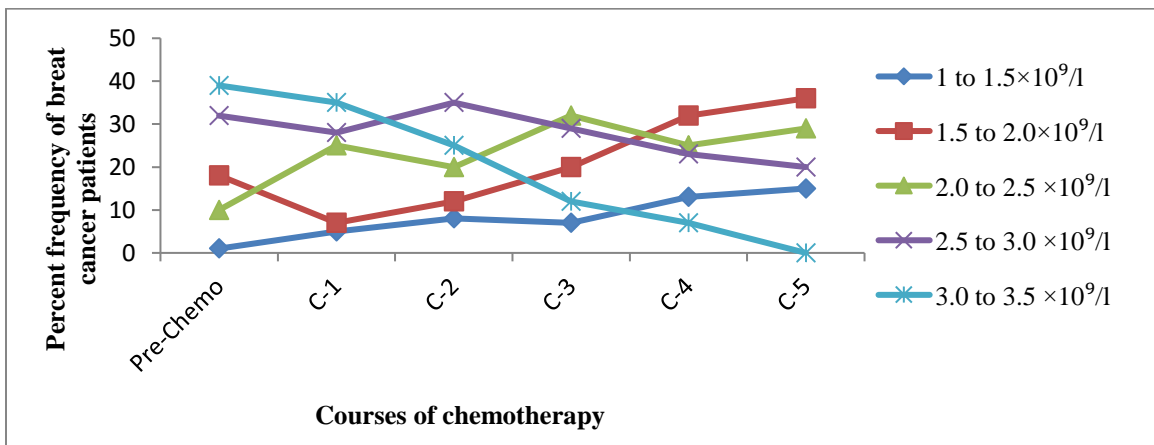


Figure 5: Variations of blood lymphocyte count of breast cancer patients during five courses of chemotherapy.

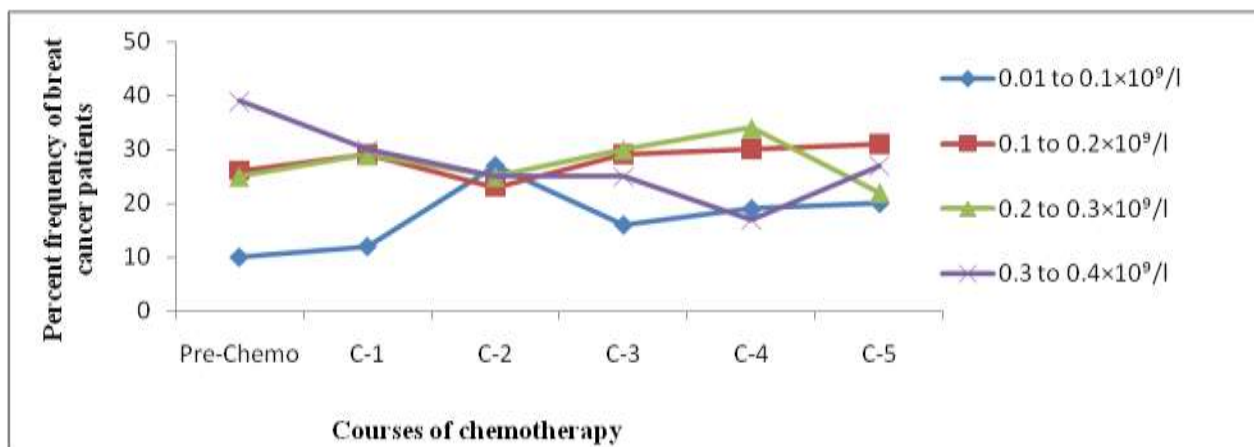


Figure 6: Variations of blood Eosinophil count of breast cancer patients during five courses of chemotherapy.

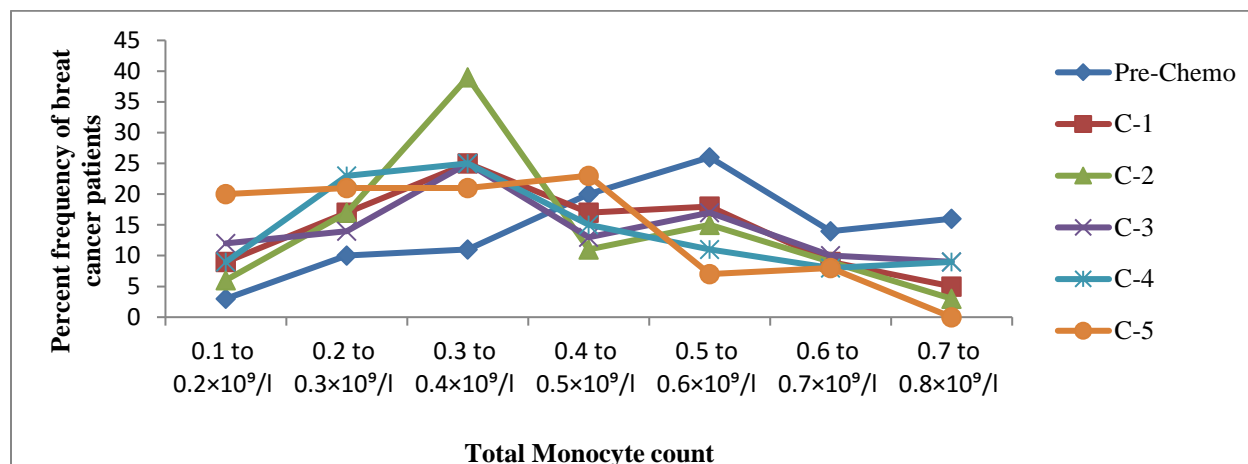


Figure 7: Variations of blood Monocytes count of breast cancer patients during five courses of chemotherapy.

## Discussion

Breast cancer directly affects the blood parameters of patients. The complete blood count (CBC) provides important information regarding the number and types of cells in the blood, mainly RBCs, WBCs and platelets [7]. Routine blood count investigation is a part of follow-up of breast cancer patients. Complete blood count reflects the response of cellular immunity in breast cancer patients, alteration in any hematological parameter influences the diseases progression.

Anemia is very common in breast cancer patients receiving chemotherapy and is associated with poor clinical outcomes. In the present study, it was observed that hemoglobin level decreases from first course of chemotherapy to fifth course of chemotherapy, similar to many other studies [3, 8]. Krishna et al. (2004) observed that majority of breast cancer patients experienced chemotherapy induced anemia. They also observed that incidence and severity of anemia may vary with type of cancer, extent of diseases and chemotherapy regimen. Chemotherapy induced anemia can be treated with erythropoiesis stimulated agents, RBC transfusions etc. Some other studies found no significant difference between blood haemoglobin concentrations and different levels of chemotherapy treatment [9, 10].

In the present study, the level of TLC was observed to be decreased with the progression of chemotherapy from course one to five, similar to other studies [1, 10]. In contrast, some studies have found elevated WBC count independent of fasting glucose level and other related factors [11]. Many studies have observed that patients with absolute granulocyte count of 6000/mm<sup>3</sup> or more have a shorter survival than the patients with less than 6000/mm<sup>3</sup> absolute granulocyte count [10]. In the present study, increased platelet count was observed which is directly related with poor outcome of diseases consistent with other studies [12, 13]. The presence of high platelets is associated with blood clotting, bleeding or stroke.

A differential leucocyte count provides information about the relative numbers of type of WBC. In the present study, differential leucocyte count included neutrophils, monocytes, eosinophil and lymphocytes. The lymphocyte count was found to be decreased with the chemotherapy treatment from course one to five, in contrast with other studies [14, 15]. No statistically significant variation was observed in neutrophils, eosinophil and monocyte during chemotherapy course, similar to other studies [3, 15].

## Conclusion

The present study focused on evaluation of complete blood count of breast cancer patients undergoing chemotherapy treatment. Chemotherapy treatment may results in increasing or decreasing level of different components of blood hence affecting the diseases mortality. Complete blood cell count (CBC) being low cost, standardized, routinely used test and offer useful information regarding the behaviour of diseases progression. The future prospective

studies examining the biology behind the prognostic value of the different components of the complete blood cell count would yield significant therapeutic progress and a thorough understanding of disease pathogenesis.

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### Conflict of interest: nil

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