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Examining Pre-and Post-chemotherapy Effects on Haemoglobin Level and Platelet Count in Breast and Colorectal Cancer Patients: A Georgetown Public Hospital Corporation Oncology Clinic Study (January 2020-December 2023)

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Abstract

Aim: *Chemotherapy is an essential treatment for breast cancer (BC) and colorectal cancer (CRC), but it often results in significant haematological side effects, such as changes in haemoglobin levels and platelet counts. This study aims to evaluate the effects of chemotherapy on haemoglobin level and platelet count in breast and colorectal cancer patients.*

Study Design: *Retrospective Cohort Study*

Place and Duration of Study: *The study was conducted at the oncology clinic of Georgetown Public Hospital Corporation (GPHC), Guyana, from January 2020 to December 2023.*

Methodology: *The study included 220 breast cancer cases and 30 colorectal cancer cases. Mean Haemoglobin (Hb) levels and platelet (Plt) counts pre- and post-chemotherapy were analysed through Paired-Samples t- tests, while linear regression was used to analyse the post- chemotherapy values against predictors such as stage of cancer and treatment regimen, gender and ethnicity.*

Results: *The mean age for breast cancer patients was 52.51 ± 9.0 whereas, for colorectal patients it was 54.20 ± 9.18. The most prevalent breast cancer was that of invasive ductal carcinoma (93.2%), while the most prevalent type of colorectal cancer was colon cancer (63.3%). Adriamycin and cyclophosphamide (78.6%) were the primary treatment regimen for breast cancer patients. Furthermore, 50 % of colorectal cancer patients were primarily on the regimen of folinic acid, fluorouracil and oxaliplatin (FOLFOX). Statistically significant differences were found in both haemoglobin levels and platelet counts before and after chemotherapy for both groups. For breast cancer patients, the mean difference in haemoglobin levels and platelet counts were 0.71 g/dl and 32.39 x 10^9/L respectively. For colorectal cancer patients, the mean difference in haemoglobin levels and platelet counts were 0.81 g/dl and 73.43 x 10^9/L respectively.*

Conclusion: *Chemotherapy significantly affects haemoglobin levels and platelet count in both breast and colorectal cancer patients.*

Keywords: Cervical Cancer, HPV, Triage Test

Introduction

Background to the Problem

Cancer is regarded as a disease where cells transform abnormally and proliferate uncontrollably, due to genetic and epigenetic factors [1]. A comprehensive analysis by the International Agency for Research on Cancer (IARC), revealed that breast and colorectal cancers are among the most commonly diagnosed cancers within South America [2].

Across the South American region in 2022, there were 1,155,885 new cases of cancer for both sexes. From these cases, it was estimated that 165,427 were newly diagnosed breast cancer patients and within that cohort, an estimated 43,253 died. Notably, all newly diagnosed breast cancer patients were reported as females [3]. In Guyana, the burden of cancer was as significant as in more developed countries. Estimates from 2022 indicated that there were 1,225 new cancer cases that year, which included 229 breast cancer cases; 67 of which resulted in death [4].

Another important cause of cancer-related death is colorectal cancer. In 2022, it was reported that across South America, there were 112,317 new colorectal cases that year (56,725 males and 55, 592 females) and within that cohort, an estimated 55,543 died [3]. However, in Guyana, the clinical picture was less stark. In 2022, there was an estimate of 79 new cases of colorectal cancer and 46 deaths [4]. Nonetheless, chemotherapy is an indispensable approach for managing patients with breast and colorectal cancer and has significantly improved the overall patient survival rate [5,6].

Despite its efficacy, chemotherapy has been directly linked to a range of complications that can adversely impact a patients' well-being; where myelosuppression is one such complication [7]. Chemotherapy-induced myelosuppression is characterized by diminished number of bone marrow progenitor cells, and abnormal complete blood cell count results [5-7]. Chemotherapy-induced thrombocytopenia (CIT) is a potentially serious complication where there is an abnormally low Plt count.

Cytotoxic chemotherapy agents would limit the production of megakaryocyte progenitors which leads to decreased thrombocyte production and subsequently causes CIT [8-10]. CIT can cause delays, reductions, or discontinuation of chemotherapy doses leading to poor patient outcomes. Moreover, CIT raises the risk of significant bleeding events, possibly resulting in hospitalization [10]. With regards to chemotherapy-induced anaemia (CIA), this is the most common haematological abnormality in cancer patients undergoing aggressive chemotherapy [12]. It results from the invasion of normal tissue by cancer leading to blood loss, bone marrow infiltration with disruption of erythropoiesis, and functional iron deficiency due to inflammation [11,12]. Beyond the physiological aspects, CIA extends its impact to the quality of the patient's life.

Common clinical presentations such as tiredness, dyspnoea, vertigo, anorexia, and poor concentration are some of the challenges the patient may experience [12]. Although chemotherapy is a mainstay of cancer treatment, it is important that the full spectrum of the chemotherapeutic effects on cancer patients receiving treatment is taken into consideration when managing these patients. Holistically, this should involve consistent monitoring of a patient's haematological profile; particularly their Hb levels and Plt counts [13].

Problem

Although the chemotherapeutic regimens used at GPHC effectively treat breast and colorectal cancer, there are no published studies on the monitoring of markers associated with myelosuppression (i.e., Hb level and Plt count) to the use of current regimens.

Purpose and Significance of the Research

The purpose of this research is to assess the impact of chemotherapy on Plt count and haemoglobin levels in breast cancer and colorectal cancer patients, pre-and post-treatment. Significantly, this information can be used to guide physicians when they are modifying patient treatment regimens or
considering the use of newer chemotherapeutic agents [14-18].

Research Questions

1. What is the mean Hb level among pre- and post-chemotherapy patients with breast and colorectal cancer?

2. What is the mean Plt count among pre- and post-chemotherapy patients with breast and colorectal cancer?

3. Does staging determine the extent to which mean Hb level and mean Plt count vary among breast and colorectal cancer patients?

Method

Study Design

This retrospective study analyzed the effects of chemotherapy on haemoglobin levels and platelet counts in breast and colorectal cancer patients. The study period spanned 1st January 2020 to 31st December 2023, during which relevant patient data were collected. The data were accessed for research purposes on 15th January 2024. All patient records were anonymized prior to analysis. The authors did not have access to personally identifiable information during or after data collection; only de-identified data were used for statistical analysis [19-24].

Setting

The study was conducted at GPHC, following approval from the Ministry of Health Institutional Review Board (IRB) on April 3, 2024, and subsequent approval from GPHC on June 21, 2024. Permission to access patient records was granted by the clinical coordinator of the oncology clinic. Pages 49-51 within the manuscript comprise the IRB memo and approval letter from Guyana's Ministry of Health IRB (FWA00030719). The IRB approval protocol is W#012/2024. These and other pertinent information are available under the supporting information heading within the manuscript [25-30].

Participants

Inclusion Criteria: Patients aged 18-65 years diagnosed with breast cancer, triple-negative breast cancer, or colorectal cancer confirmed through histopathological examination. Patients who received chemotherapy with specific agents were included: adriamycin, cyclophosphamide, paclitaxel, cisplatin, carboplatin (for breast cancer), FOLFOX and capecitabine (for colorectal cancer).

Exclusion Criteria: Patients were excluded if they were under 18 years old, deceased, had lab results from non-GPHC laboratories, were immunocompromised (e.g., HIV-positive), were on blood thinners (e.g., Warfarin), had a history of completed chemotherapy with cancer recurrence,
had known haematological disorders (e.g., Thalassemia), had incomplete sociodemographic or laboratory data, or had comorbidities such as HBV, HCV, or Tuberculosis [31-35].

Selection of Participant

A total of 220 breast cancer medical records and 30 colorectal cancer medical records were selected using purposive sampling. This method allowed for the intentional selection of medical records that met the study's inclusion criteria [36-40].

Variables

- **Haematological outcomes (quantitative, dependent):** i) Hb Level ii) Plt Count

- **Predictors (qualitative, independent):** i) Type of Cancer ii) Stage of Cancer iii) Treatment Regimen

- **Confounding factors (qualitative):** i) Age ii) Gender iii) Ethnicity.

Data Sources/Measurement

Data were extracted from patient medical records, including demographic details (age, sex, ethnicity), cancer type and stage, tumour grade, treatment regimens, and haematological parameters [41-45].

Bias

The researchers addressed bias by catering to an extensive and diverse sample population that represented various demographics (such as every ethnicity, gender and stage of cancer that was evident among patient records). There was an inclusion and exclusion criteria, and also a rationale for the purposive sampling of these patient records. Multiple linear regression was utilised to control for potential confounding variables (such as gender and ethnicity).

Study Size

The sample size was determined based on the availability of eligible patients within the study period. The researchers were able to obtain a sample of 220 BC patient records and 30 CRC patient records [46-50].

Statistical Methods

Descriptive Statistics

The means, standard deviations, and standard errors, were calculated for haemoglobin level and platelet count before and after chemotherapy. These statistics provided an overview of the central tendency and variability of the data [51-55].

Paired Sample T-Tests

Paired Sample t-tests were conducted to assess whether there was a statistically significant difference between mean pre-chemotherapy and mean post-chemotherapy values. A p-value < 0.05 was considered statistically significant [56-60].

Linear Regression

Linear regression analyses were used to explore if there was a relationship between specific subgroups and Hb level or Plt count after chemotherapy. The study population, which included both breast and colorectal cancer patients, was divided into subgroups based on factors such as cancer stage, gender, ethnicity, and chemotherapy regimen. For both CRC and BC data, multiple linear regression was used to model the relationship between Hb level after chemotherapy and the predictors (stage of cancer and the treatment regimen).

The same was conducted for Plt count after chemotherapy. Multiple linear regression was also used to model the relationship for the respective haematological parameters after chemotherapy and the predictors (gender and ethnicity) for CRC records, which included both males and females. However, for BC records, a simple linear regression was done to model the relationship between ethnicity and the respective haematological parameters after chemotherapy; since all BC data comprised female patients [61-65].

Results

Participants

Table 1: Participants of the Breast Cancer Study Population.

Stage of Study	Breast Cancer Patients
Potentially Eligible	363
Examined for Eligibility	250
Confirmed Eligible	220
Included in the Study	220
Analyzed	220

Table 1 outlines the participants in the breast cancer study population. Initially, 363 breast cancer patient records were identified for this study. After reviewing 250 patient records, 220 were found to meet the study's eligibility criteria while 30 patient records were excluded due to being immunocompromised or having incomplete laboratory data.

Table 2: Participants of the Colorectal Cancer Study Population.

Stage of Study	Colorectal Cancer Patients
Potentially Eligible	50
Examined for Eligibility	35
Confirmed Eligible	30
Included in the Study	30
Analyzed	30

Table 2 outlines the participants in the breast colorectal cancer study population. Initially, 50 colorectal cancer patient records were identified for this study. After reviewing 35 patient records, 30 were found to meet the study's eligibility criteria while 5 patient records were excluded due to being immunocompromised or having incomplete laboratory data.

Descriptive Data

Table 3: Demographic and Clinical Characteristics of the Breast Cancer Study Population.

Variables	Categories	Frequency (n=220)	Percentage (100%)	Mean ± SD
Age Gender Ethnicity	18-65	220	100	52.51 ± 9.0
	Female	220	100	NA
	Amerindian	14	6.4	NA
	African	80	36.4	NA
	East Indian	83	37.7	NA
	Portuguese	-	-	NA
	Chinese	1	0.5	NA
	Mixed	42	19.1	NA
Diagnosis	Invasive Ductal Carcinoma	205	93.2	NA
	Invasive Lobular Carcinoma	5	2.3	NA
	Invasive Medullary Carcinoma	2	0.9	NA
	Infiltrative Ductal Carcinoma	5	2.3	NA
	Invasive Nodular Carcinoma	1	0.5	NA
Stage of the Cancer	Tubular Carcinoma	1	0.5	NA
	Mixed Type Carcinoma	1	0.5	NA
	I	31	14.1	NA
	II	121	55.0	NA
	III	51	23.2	NA
	IV	17	7.7	NA
Treatment Regimen	Adriamycin, Cyclophosphamide, Flush	173	78.6	NA
	Paclitaxel, Flush	10	4.5	NA
	Cyclophosphamide, Docetaxel, Flush	2	0.9	NA
	Adriamycin, Cyclophosphamide, Paclitaxel, Flush	18	8.2	NA
	Cyclophosphamide, Docetaxel, Adriamycin, 5FU, Methotrexate, Flush	3	1.4	NA

	Cisplatin, Docetaxel, Paclitaxel, Flush	1	0.5	NA
	Docetaxel, Carboplatin, Flush	4	1.8	NA
	Adriamycin, Cyclophosphamide, Paclitaxel, Docetaxel, Flush	2	0.9	NA
	Docetaxel, Gemcitabine, Flush	3	1.4	NA
	Cyclophosphamide, Paclitaxel, Methotrexate, Flush	2	0.9	NA
	Carboplatin, Paclitaxel, Flush	2	0.9	NA

Table 3 provides an overview of the demographic and clinical characteristics of the breast cancer study population. The study included 220 female breast cancer patients, with a mean age of 52.51
± 9.0 years. Among the patients, East Indians were the most prevalent group at 37.7%, followed closely by Africans at 36.4%. The most prevalent breast cancer was that of invasive ductal carcinoma (93.2%) followed by invasive lobular carcinoma (2.3%) and infiltrative ductal carcinoma (2.3%). Most patients had stage II (55.0%) breast cancer. The most common treatment regimen was adriamycin, cyclophosphamide and flush (78.6 %).

Table 4: Demographic and Clinical Characteristics of the Colorectal Cancer Study Population.

Variables	Categories	Frequency (n=30)	Percentage (100%)	Mean ± SD
Age	18-65	30	100.0	54.20 ± 9.18
Gender	Female	18	60.0	NA
	Male	12	40.0	NA
Ethnicity	African	15	50.0	NA
	East Indian	12	40.0	NA
	Mixed	3	10.0	NA
Diagnosis	Colon Cancer	19	63.3	NA
	Rectal Cancer	11	36.7	NA
Stage of the Cancer	II	16	53.3	NA
	III	9	30.0	NA
	IV	5	16.7	NA
Treatment Regimen	FOLFOX 6, Flush	15	50	NA
	Capecitabine	2	6.7	NA
	FOLFOX 6,			
Capecitabine, Flush	13	43.3	NA	

Table 4 provides an overview of the demographic and clinical characteristics of the colorectal cancer study population. The study included 30 colorectal cancer patients with a mean age of 54.20 ± 9.18 years. Among the patients, Africans (50.0%) were the most prevalent group, followed closely by East Indians (40.0%). The most prevalent colorectal cancer was that of colon cancer (63.3%) followed by rectal cancer (36.7%). Most patients had stage II (53.3%) colorectal cancer. The most common treatment regimen was FOLFOX 6 and flush (50.0%).

Main Results

Table 5: Mean Pre- and Post- Chemotherapy Values for the Breast Cancer Study Population.

Haematological Parameters	Pre- Chemotherapy Mean ± SD	Post- Chemotherapy Mean ± SD	P-value
Haemoglobin Level	12.21 ± 1.27	11.50 ± 1.32	0.000*
Platelet Count	320.56 ± 118.42	288.18 ± 123.37	0.000*

* Statistically significant at $p < 0.05$.

Table 5 summarises the mean pre- and post- chemotherapy values for the breast cancer study population. The mean pre- chemotherapy Hb level for breast cancer patients was 12.21 ± 1.27 g/dl, and the post- chemotherapy Hb level for breast cancer patients was 11.50 ± 1.32 g/dl, reflecting a mean difference of 0.71 g/dl. The mean pre- chemotherapy Plt count for breast cancer patients was 320.56 ± 118.42 x 10^9/L, and the post- chemotherapy Plt count for breast cancer patients was 288.18 ± 123.37 x 10^9/L, reflecting a mean difference of 32.39 x 10^9/L.

Table 6: Mean Pre- and Post- Chemotherapy Values for the Colorectal Cancer Study Population.

Haematological Parameters	Pre- Chemotherapy Mean ± SD	Post- Chemotherapy Mean ± SD	P-value
Haemoglobin Level	12.52 ± 1.31	11.71 ± 1.17	0.003*
Platelet Count	276.30 ± 127.58	202.87 ± 67.71	0.000*

Table 6 summarises the mean pre- and post- chemotherapy values for the colorectal cancer study population. The mean pre-chemotherapy Hb level for breast cancer patients was 12.52 ± 1.31 g/dl, and the post- chemotherapy Hb level for breast cancer patients was 11.71 ± 1.17 g/dl, reflecting a mean difference of 0.81 g/dl. The mean pre- chemotherapy Plt count for breast cancer patients was 276.30 ± 127.58 x 10^9/L and the post- chemotherapy Plt count for breast cancer patients was 202.87 ± 67.71 x 10^9/L, reflecting a mean difference of 73.43 x 10^9/L.

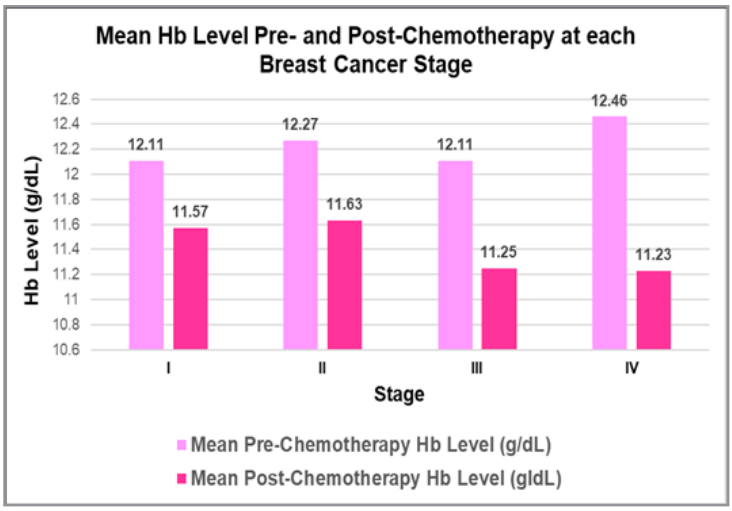

Figure1: Mean Hb Level Before and After Chemotherapy for the Breast Cancer Stages.

Figure 1 illustrates the mean Hb count pre- and post- chemotherapy for breast cancer stages. There were slight variations of the mean Hb levels at each stage. The mean differences for stages I-IV were 0.55 g/dl, 0.64 g/dl, 0.86 g/dl and 1.23 g/dl respectively. These results indicate that the decrease in Hb levels post chemotherapy progressively increased with advancing cancer stages, with Stage IV showing the greatest reduction.

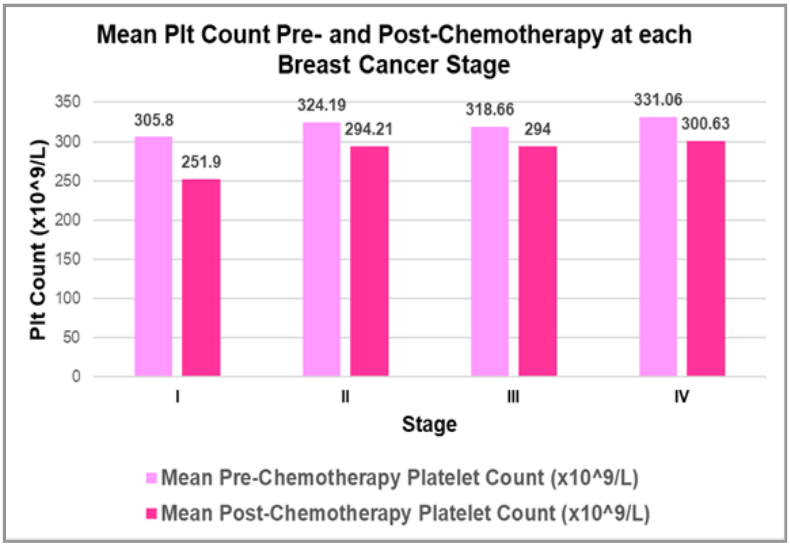

Figure 2: Mean Plt Count Before and After Chemotherapy for the Breast Cancer Stages.

Figure 2 illustrates the mean Plt count pre- and post- chemotherapy for breast cancer stages. There were noticeable variations in the mean Plt counts at each cancer stage. The mean differences for stages I to IV were 53.90 x 10^9/L, 29.98 x 10^9/L, 24.66 x 10^9/L and 30.44 x 10^9/L respectively. These results indicated that the reduction in Plt count post-chemotherapy varied across stages, with Stage I showing the largest decrease and more moderate changes observed in later stages.

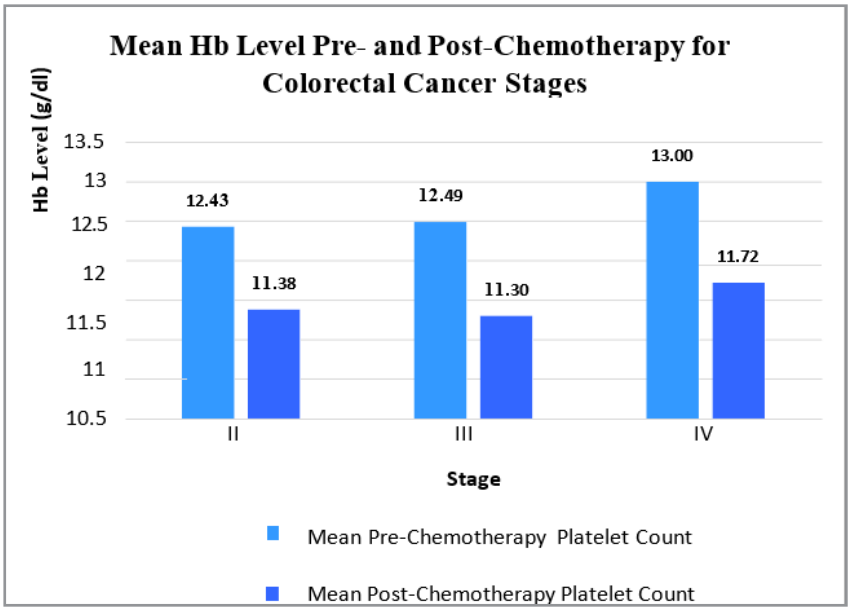

Figure 3: Mean Hb Level Before and After Chemotherapy for the Colorectal Cancer Stages

Figure 3 illustrates the mean Hb count pre- and post- chemotherapy for colorectal cancer stages. There were slight variations of the mean Hb levels at each stage. The mean differences for stage II to IV were 1.05 g/dl, 1.19 g/dl and 1.28 g/dl respectively. These results indicate that the decrease in Hb levels after chemotherapy progressively increased with advancing cancer stages, with Stage IV showing the greatest reduction.

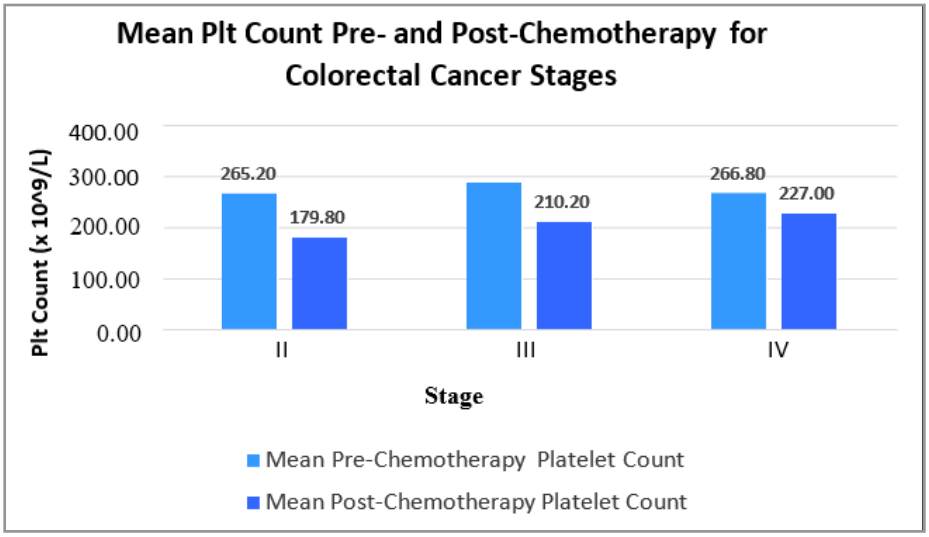

Figure 4: Mean Plt Count Before and After Chemotherapy for the Colorectal Cancer Stages.

Figure 4 illustrates the mean Plt count pre- and post- chemotherapy for colorectal cancer stages. There were noticeable variations in the mean Plt counts at each cancer stage. The mean differences for stage II to III were 85.40 x 10^9/L, 76.67 x 10^9/L and 39.80 x 10^9/L respectively. These results indicate that the reduction in platelet count after chemotherapy varied across the cancer stages, with a more pronounced decrease in earlier stages (Stage II and III) compared to Stage IV.

Discussion

Breast Cancer

From a sample population of breast cancer patients (n= 220), there was a statistically significant difference in both the mean Hb level and Plt count after chemotherapy ($p < 0.001$ and $t > 1.972$ for both parameters) at the 95% CI. This indicated that chemotherapy had a significant impact (decrease) on both of these parameters.

Particularly, the mean difference between Hb levels before and after chemotherapy was 0.71182 g/dl, while the mean difference between platelet counts before and after chemotherapy was 32.38636 x 10^9/L. These findings aligned with the literature,

which corroborated a marked reduction in those haematological parameters due to bone marrow suppression and impaired haematopoiesis [66-70].

However, there were statistically significant ($p < 0.001$) moderate and strong positive correlations ($R = 0.46$ for Hb level, $R = 0.70$ for Plt count) for the respective parameters, which suggested that patients with higher Hb and Plt values before chemotherapy, were likely to have higher values after chemotherapy [71]. Upon further analyses, it was found that the stage of breast cancer in tandem with the treatment regimen for chemotherapy, had a weak positive ($R= 0.120$) correlation; where merely 1.4% of the variance ($R2 = 0.014$) in Hb level after chemotherapy, was explained by the stage of breast cancer (i.e., stages I-IV) and the treatment regimen (i.e., adriamycin and cyclophosphamide which were predominantly administered for all stages through dosages based on body surface area). Notably, this weak positive correlation was not significant ($p > 0.05$); which reinforced that these predictors were not a good fit for the data [72,73].

Likewise, it was found that the stage of breast cancer and treatment regimen for chemotherapy collectively had a weak positive ($R= 0.110$) correlation where merely 1.2 % of the variance ($R2 = 0.012$) in Plt count after chemotherapy, was explained by the stage of breast cancer and the treatment regimen [74-80]. This weak positive correlation was also not significant ($p > 0.05$). To elaborate, the ethnicity of the patients was also analyzed against the values after chemotherapy, for these haematological parameters. It was found that ethnicity (African, East Indian, Mixed, Amerindian and Chinese) had a weak positive ($R= 0.024$) correlation where merely 0.1% of the variance ($R2= 0.001$) in Hb level after chemotherapy, was explained by the same. This weak positive correlation was not significant ($p > 0.05$) [81,82].

As for Plt count after chemotherapy, it wasthat ethnicity also had a weak positive ($R= 0.018$) correlation where 0.0 % (none) of the variance in Plt count after chemotherapy, was explained by the same. Such observations reflected the literature which indicated that factors beyond cancer stage and treatment protocol, such as genetic predisposition, nutrition and underlying comorbidities may play a more significant role in determining the extent of hematologic changes [83-90].

Colorectal Cancer

Meanwhile, from a sample population of colorectal cancer patients ($n =30$), there was a statistically significant difference in both the mean Hb level and Plt count after chemotherapy ($p <0.05$ and $t >1.972$ for both parameters) at the 95% CI.

This indicated that chemotherapy significantly impacted (decrease) both of these parameters. Particularly, the mean difference between Hb level before and after chemotherapy was 0.81 g/dl, while the mean difference between Plt count before and after chemotherapy was 73.43 x 10^9/ L. As mentioned for the BC findings, these findings for CRC were also consistent with the literature [91-95].

Nonetheless, Hb levels showed a statistically significant ($p < 0.05$), moderately positive correlation ($R= 0.40$) before and after chemotherapy; whereas, the Plt count showed a statistically significant ($p < 0.001$) strongly positive correlation ($R=0.68$) before and after chemotherapy [96,97].

Upon further analyses, it was found that the stage of colorectal cancer and treatment regimen for chemotherapy collectively had a very weak positive ($R=0.104$) correlation where merely 1.1% of the variance ($R2=0.011$) in Hb level after chemotherapy, was explained by the stage of colorectal cancer (i.e., stages II-IV) and the treatment regimen (i.e., FOLFOX 6 and capecitabine were predominately administered for all stages through dosages based on body surface area). Notably, the weak positive was not significant ($p > 0.05$), which reinforced that these predictors were not a good fit for the data [98,99].

Likewise, it was found that the stage of colorectal cancer and treatment regimen for chemotherapy collectively had a very weak positive ($R=0.086$) correlation where merely 0.7% of the variance ($R2=0.007$) in Plt count after chemotherapy, was explained by the stage of colorectal cancer and the treatment regimen [100, 101].

The weak positive correlation was also not significant ($p > 0.05$). To elaborate, the ethnicity of the patients was also analysed against the values after chemotherapy, for these haematological parameters. It was found that ethnicity (African, East Indian, Mixed) had a weak positive ($R=0.104$) correlation where merely 1.1% of the variance ($R2 = 0.011$) in Hb level after chemotherapy, was explained by the same.

This weak positive correlation was not significant ($p>0.05$). As for the Plt count after chemotherapy, it was found that ethnicity also had a weak positive ($R=0.148$) correlation where 2.2% of the variance ($R2 =0.022$) in Plt count after chemotherapy, was explained by the same [102-105].

Ultimately, while chemotherapy in general impacts Hb levels and Plt counts, the variability in Hb levels and Plt counts post-chemotherapy was not well explained by the stage of cancer, treatment regimen or ethnicity since they were not significant predictors. These inferences highlight the need for further research with larger sample sizes and additional predictors which may better explain the observed changes in Hb level and Plt count [106,107].

Limitations

- Some patient data such as genetic predisposition, lifestyle factors such as smoking status, diet and comorbidities were not documented within their files.
- Some patients were inactive due to migration, death and treatment at secondary institutions.
- Patient charts were neither organised nor filled according to standard protocols.
- All charts were manually filled and the doctor's handwriting was not always legible.

Generalisability

Sample Size

The sample size of 220 for BC patients was likely representative of the broader population of breast cancer patients within Guyana. Conversely, the study only included 30 CRC patients. This was a small sample size which limited the generalizability of the results to the broader population of CRC patients within Guy-

ana. Thus, the findings from this small cohort may not accurately represent the effects of chemotherapy on haemoglobin level and platelet count for CRC patients within Guyana [108-110].

Chemotherapy Regimens

The chemotherapy regimens used in the study were specific to GPHC and may or may not be the same to those used at other hospitals. Particularly, GPHC's BC patients were generally administered with adriamycin and cyclophosphamide, while their CRC patients were generally administered with FOLFOX 6 and capecitabine [111-115].

Cancer Type

The haematological results from CRC patients were not generalizable to BC patients and vice versa. Thus, the effects of chemotherapy on haemoglobin level and platelet count differed between these two groups [116, 117].

Conclusions and Recommendations

It can be concluded that for both breast and colorectal cancer patients, there was a statistically significant difference between the mean Hb level and Plt count before and after chemotherapy. Some key recommendations posited to the oncology clinic (which they have started to embark on) include timely supportive therapies and transfusion guidelines for patients with a lower-than- normal Hb level and Plt count. For instance, nutritional support interventions may enhance blood cell production through supplements such as iron, vitamin B12, vitamin C, vitamin K and folate. To add, prescriptive erythropoiesis-stimulating agents (ESAs) and/or thrombopoietin receptor agonists (TPO-RAs) can also be utilised in a timely manner to stimulate erythrocyte and thrombocyte production respectively [118-120].

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