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Cross-sectional Study

Characteristics of breast cancer patients at dr. Sardjito Hospital for early anticipation of neutropenia: Cross-sectional study

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ABSTRACT

The highest prevalence of breast cancer in Indonesia is in the Province of Yogyakarta. dr. Sardjito General Hospital has quite complete clinical data on breast cancer patients. Characteristics of the population in various regions in Indonesia are different from one another. This problem is the basis for doing this research. Statistical data analysis needs to be done in each area for better diagnosis and treatment of cancer. Data recording is carried out continuously during outpatient treatment at dr. Sardjito General Hospital. Data for breast cancer patients was taken from July 2018 to June 2020. The data obtained were grouped into four categories: laboratory investigation, socio-demographic, clinical examination, and pathology. Descriptive and correlation analysis aims to determine the characteristics of breast cancer patients seeking treatment at dr. Sardjito General Hospital and anticipate their possibility of developing neutropenia after chemotherapy. The results of the descriptive analysis are significant to determine patient characteristics and treatment steps that can be taken. Correlation analysis variables closely related to neutrophils included leucocyte count, lymphocyte, monocyte, albumin, age at first diagnosis, and height. These variables can be a severe concern of medical personnel before undergoing chemotherapy, especially lymphocytes, which have the largest (negative) correlation and can be an early sign of neutropenia.

1. Introduction

Breast Cancer is a malignant tumor that attacks breast tissue. Breast cancer causes breast cells and tissue to change into abnormal shapes and multiply uncontrollably. The World Health Organization (WHO) in 2020 stated that breast cancer is cancer with the most new cases in the world. The WHO estimates there are 2,261,419 new cases and 684,996 people died of breast cancer in 2020. Approximately 2 million new breast cancer cases are found each year based on a survey conducted by WHO. It makes breast cancer the most common type of cancer in women after cervical cancer [1].

Not much different from developed countries, cancer is now the seventh most deadly disease in Indonesia. Of the many types of cancer suffered by Indonesia's population, the Ministry of Health notes that breast cancer is the most common cause. Based on the Hospital Information System (SIRS) in 2014, the number of outpatients and inpatients with breast cancer was 12,014 people (28.7%). The highest prevalence of breast cancer in Indonesia is in the Province of Special Region of Yogyakarta by 0.41% based on the data and information center report, Ministry of Health, Indonesia in 2019 [2].

dr. Sardjito General Hospital is the top referral hospital in the Special Province of Yogyakarta and also functions as an academic hospital. It has an ambulatory cancer service, namely Tulip (Integrated Cancer Clinic). According to the Hospital-Based Cancer Registration Report, breast cancer cases reached 28.2%, the highest incidence of all cancers based on data collected from 2008 to 2017. Most patients who come for treatment at the TULIP installation have entered an advanced stage (41.0% at stage 4 and 40.8% at stage 3) [3]. If breast cancer is found at an advanced stage, treatment becomes more complex and expensive, and the treatment results are unsatisfactory and even accelerate death [4].

The disease will be treated with a better outcome when detected in

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an earlier stage. The higher the stages, the smaller the life expectancy. No cancer has a 100% mortality rate, meaning that treatment can be done to get a cure, especially if treatment is started early [5]. Beside delay at presentation, other factors may influence the success of treatment outcome and patient's response. Those factors include socio-demographic and clinicopathological variables and the presence of comorbidities.

One of the comorbidities is a side effect of chemotherapy, namely neutropenia. Neutropenia is defined as a decreasing number of neutrophils in the circulating blood. Chemotherapy-induced neutropenia is one of the most common toxic effects experienced by patients and often threatens the efficiency of chemotherapy use. Neutropenia usually occurs 7–10 days after chemotherapy. It can increase the risk of a complication of infection and fever known as febrile neutropenia (FN) [6]. In several papers, they consider the prediction of the occurrence of neutropenia in breast cancer patients [7–9]. The analysis of neutropenia in this study was carried out as an early anticipation of the decrease in neutrophils due to chemotherapy treatment.

Several studies have been conducted relating to cancer registry data in the world. Based on research by Pathy et al. [10], Seneviratne et al. [11], and Jazayeri et al. [12] several countries, especially Singapore-Malaysia, New Zealand, and Iran in the study still lacked data completeness, data accuracy, and lack of quality data, so there are bias and inaccurate research results. Better results were obtained by Hartmann-Johnsen et al. [13], Pashaei et al. [14], and Thompson et al. [15] studies in which the cancer registry data that was used was able to capture the picture of breast cancer events in their countries.

Recording data on cancer patients regularly is still rarely found in hospitals in Indonesia. Usually, only data about mortality and morbidity are available. Aryanti et al. [16] summarized the demographic aspects of breast cancer subjects at Sanglah General Hospital, Denpasar, Bali, from 2012 to 2019. It was done because epidemiological data for breast cancer in Bali were not available. Yogyakarta has more complete cancer data than Bali. However, no one has researched the characteristics of breast cancer subjects in Yogyakarta.

Characteristics of the population in various regions in Indonesia are different from one another. Likewise, patients in Yogyakarta certainly have differences from patients in Bali, as well as other regions. This can happen because of differences in geographic location and phenotypic breast cancer subjects. This problem is the basis for doing this research. Statistical data analysis needs to be done in each area for better diagnosis and treatment of cancer.

Characteristics of breast cancer patients were observed in this study by descriptive analysis of each variable in the patient's medical record data. Meanwhile, the possibility of neutropenia in breast cancer patients was investigated based on the correlation of neutrophils with other variables.

2. Methods

This research is a study related to the bio profile of breast cancer patients and their treatment based on medical record data. Data recording is carried out continuously during outpatient treatment at dr. Sardjito General Hospital. Patients that meet the inclusion criteria of the study will be prospectively followed since diagnosis, during treatment, until minimal two years after first chemotherapy ends. Data recording is carried out continuously during outpatient treatment at dr. Sardjito General Hospital.

The data obtained is the primary data for breast cancer patients was taken from July 2018 to June 2020. Baseline data obtained included socio-demographic, clinical records, pathological, and treatment data. During treatment, clinical data were continually collected. After treatment, assessment of treatment outcome and life status was also determined. The data obtained were grouped into five categories: laboratory investigation, socio-demographic, clinical examination, and pathology.

The data obtained were analyzed to obtain important information about the disease and the patient's characteristics, thus helping the treatment process. Data analysis based on the cancer registry has been carried out in cancer studies in Indonesia [16–19]. In contrast to previous studies, this study uses data on cancer patients in the Special Region of Yogyakarta, the highest province with cancer prevalence in Indonesia.

Data analysis in this study includes descriptive analysis and correlation analysis. Descriptive analysis was carried out from patient data for each category, using comprehensive data or data grouped by age or stage. The correlation analysis used in this study was the Kendall-Tau Test and the Pearson Chi-Square Test. Descriptive and correlation analysis aims to determine the characteristics of breast cancer patients seeking treatment at dr. Sardjito General Hospital Yogyakarta, and anticipate their possibility of developing neutropenia after chemotherapy.

This study was approved by the Ethical Clearance of Medical and Health Research Ethics Committee (MHREC) Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada – dr. Sardjito General Hospital. Registration number: KE/FK/0444/EC/2020. The methods were reported in accordance with The STROCSS 2019 Guideline [20].

3. Results

3.1. Descriptive statistics of examination

Descriptive analysis was used to see the description of breast cancer patient data. The initial examination of patients obtained medical records and hospital laboratory data as many as 175 patients. Not all 175 patients have complete data; there are variations in the amount of data (N) for each variable, see Table 1.

Descriptive analysis of laboratory results was grouped into four based on the stage of the disease right when the patient was first treated, see Tables 2–5. The detailed descriptive analysis from medical record data results shows each variable's minimum, maximum, mean, and standard deviation values.

Based on medical record data, the mean age in this cohort is 52 years (range from 32 to 78). The standard deviation value of 9.35 shows the age variation of breast cancer patients. The mean Karnofsky index of the patient is 0.85, meaning that breast cancer patients who come for treatment for the first time can generally have normal activities, but there are some signs or symptoms of the disease.

For patients with the worst condition, namely Karnofsky Index 0.3, meaning that there is a patient who comes first for treatment with a severe disability, hospital admission is indicated, although death is not imminent. The patient's body mass index was obtained from body weight and height. The BMI calculation result shows that the average patient has a BMI of 23.89, so it can be concluded that the patients are slightly overweight. BMI values at ideal body weight are 18.5–22.9. However, there were also very underweight patients with a BMI of 13.51 and obese patients with a BMI of 56.

In Tables 2–5, the normal value is the reference value for determining whether each laboratory examination item has an abnormality. The average patient still had normal blood conditions from these tables, except for neutrophils and SGOT in the stage 4 group. The mean neutrophils in stage 1–4 group were 0.67, 0.61, 0.61, and 0.65 respectively. All of these values were above the normal limit for neutrophils, which

Table 1
Medical record descriptive statistics.

Descriptive Statistics	N	Min	Max	Mean	Std. Deviation
Age at Diagnosis	174	32	78	52.57	9.35
Karnofsky Index	173	0.3	1	0.85	0.11
Body Weight	172	30	107	55.61	11.81
Height	172	100	172	152.77	7.45
BMI	172	13.51	56	23.89	5.31

Table 2
Laboratory descriptive statistics (stage 1).

Descriptive Statistics	N	Min	Max	Mean	Normal Value
HB	5	11.60	13.60	12.78	12–15
Leucocyte Count	5	4220	11570	8730	3500–10500
Neutrophil	5	0.52	0.84	0.67	0.4–0.6
Lymphocyte	5	0.12	0.35	0.25	0.2–0.4
Monocyte	5	0.03	0.08	0.05	0.02–0.08
Thrombocyte	5	280.00	397.00	328.40	150–400
Random Blood Glucose	4	86.00	126.00	103.25	80–140
SGOT	5	15.00	51.00	26.40	5–40
SGPT	5	17.00	58.00	29.00	7–56
Creatinine	5	0.60	0.86	0.74	0.5–1.1
Albumin	3	3.86	4.26	4.11	3.5–5

Table 3
Laboratory descriptive statistics (stage 2).

Descriptive Statistics	N	Min	Max	Mean	Normal Value
HB	45	10.00	15.00	12.73	12–15
Leucocyte Count	45	2890	17160	7494.44	3500–10500
Neutrophil	45	0.36	0.91	0.61	0.4–0.6
Lymphocyte	45	0.06	0.52	0.28	0.2–0.4
Monocyte	45	0.02	0.16	0.07	0.02–0.08
Thrombocyte	45	183.00	546.00	306.56	150–400
Random Blood Glucose	42	79.00	195.00	104.17	80–140
SGOT	45	6.00	38.00	18.04	5–40
SGPT	45	12.00	73.00	27.49	7–56
Creatinine	45	0.21	1.09	0.78	0.5–1.1
Albumin	24	3.53	5.04	4.53	3.5–5

Table 4
Laboratory descriptive statistics (stage 3).

Descriptive Statistics	N	Min	Max	Mean	Normal Value
HB	71	10.10	15.30	12.66	12–15
Leucocyte Count	71	4160	14390	7344.79	3500–10500
Neutrophil	71	0.36	0.83	0.61	0.4–0.6
Lymphocyte	71	0.03	0.47	0.28	0.2–0.4
Monocyte	71	0.00	0.14	0.07	0.02–0.08
Thrombocyte	71	180.00	576.00	304.62	150–400
Random Blood Glucose	66	85.00	285.00	118.41	80–140
SGOT	71	9.00	184.00	26.30	5–40
SGPT	71	8.00	167.00	30.62	7–56
Creatinine	71	0.46	1.53	0.78	0.5–1.1
Albumin	47	3.05	5.37	4.46	3.5–5

Table 5
Laboratory descriptive statistics (stage 4).

Descriptive Statistics	N	Min	Max	Mean	Normal Value
HB	51	8.70	15.50	11.77	12–15
Leucocyte Count	51	3740	22060	8525.69	3500–10500
Neutrophil	51	0.29	0.88	0.65	0.4–0.6
Lymphocyte	51	0.07	0.55	0.24	0.2–0.4
Monocyte	51	0.01	0.13	0.07	0.02–0.08
Thrombocyte	51	17.00	609.00	293.82	150–400
Random Blood Glucose	49	65.00	429.00	124.22	80–140
SGOT	50	8.00	553.00	58.78	5–40
SGPT	50	6.00	195.00	40.70	7–56
Creatinine	51	0.45	3.39	0.91	0.5–1.1
Albumin	42	2.54	5.05	3.82	3.5–5

was 0.6. This is reasonable considering the role of neutrophils as the first line to prevent infection. If the body is attacked, the bone marrow will produce more white blood cells, especially neutrophils, to fight it. When viewed from the neutrophil-lymphocyte ratio (NLR), the values were 2.6, 2.18, 2.18, and 2.7, respectively. The NLR value showed that the percentage of neutrophils and lymphocytes was still in the normal range (0.78–3.53).

SGOT is a liver enzyme found in liver parenchyma cells. From Table 5, it can be seen that abnormal SGOT occurred in the average patient at stage 4. The patient's average SGOT reached 58.78 U/L, well above the normal 5–40 U/L range. An increase in SGOT in the blood occurs when there is damage to liver cells. Damage can occur due to the occurrence of metastases in most stage 4 breast cancer patients at dr. Sardjito Hospital.

3.2. Descriptive analysis of socio-demographic (age, comorbidity, and marital status)

The age of the patient was recorded when he first came to the hospital during the study period. Patients were grouped by age to analyze other variables based on age, see Table 6.

Based on this table, it appears that people with breast cancer mainly occur at 46–50 years old (22.4%), followed by 51–55 years old (19.5%), and 41–45 years old (16.7%). It can be said that breast cancer patients occur at productive ages, where most patients at that age are at an advanced stage.

Comorbidity is a comorbid disease suffered by patients during breast cancer treatment. Patients suffer various carrier diseases, including dyslipidemia, asthma, gastritis, fatty liver (USG), hypertension, gout, cholelithiasis, sarcoma soft tissue, diabetes mellitus, cholesterol, allergy, ulcer, hepatitis, hypertriglyceridemia, etc. Each patient has a varying number of comorbidities. On average, they suffer from 0 to 4 types of comorbidities, the breakdown by age group is shown in Table 7 and Fig. 1.

Table 4 shows the results grouping patients by age and number of comorbidities. It is known that the number of comorbid patients was 95, more than the non-comorbid patients of 79 patients.

The highest number of patients without comorbid was 23 patients, and they were in the 46–50 years age group. The highest number of patients with comorbidities was 24 patients in the 51–55 years age group. This statistic shows that a person has many diseases at 51–55 years old. This situation can become more severe if accompanied by cancer.

Marital status for cancer was studied by Aizer et al. [21] He examined the impact of marital status at the stage of diagnosis, the use of definitive therapy, and cancer-specific mortality among each of the top 10 causes of cancer-related death in the United States. In Aizer's research, it was found that married patients were less likely to present with metastatic disease, were more likely to receive definitive therapy, and were less likely to die from cancer than unmarried patients.

Marital status was also reviewed in this study. Table 8 shows the results of grouping patients according to age and marital status. There are three marital statuses recorded in breast cancer patients: single, widow, and married, as in Table 5. The highest number of patients based on marital status is in the age group 46–50 with 34 people.

Table 6
Frequency distribution of patients by age group.

Group Number	Age Group	Frequency	Percent
1	31–35	3	1.7
2	36–40	8	4.6
3	41–45	29	16.7
4	46–50	39	22.4
5	51–55	34	19.5
6	56–60	28	16.1
7	61–65	15	8.6
8	66–70	9	5.2
9	71–75	6	3.4
10	76–80	3	1.7
Total		174	100

Table 7
Comorbidity by age group.

Age Group	Number of Comorbidities					Total Patients with Comorbid
	0	1	2	3	4	
31–35	1	2	0	0	0	2
36–40	4	2	1	1	0	4
41–45	19	8	2	0	0	10
46–50	23	12	1	3	0	16
51–55	10	17	5	1	1	24
56–60	12	13	1	0	2	16
61–65	7	7	1	0	0	15
66–70	1	4	3	0	1	8
71–75	1	4	0	1	0	5
76–80	1	2	0	0	0	2
Total	79	71	14	6	4	95

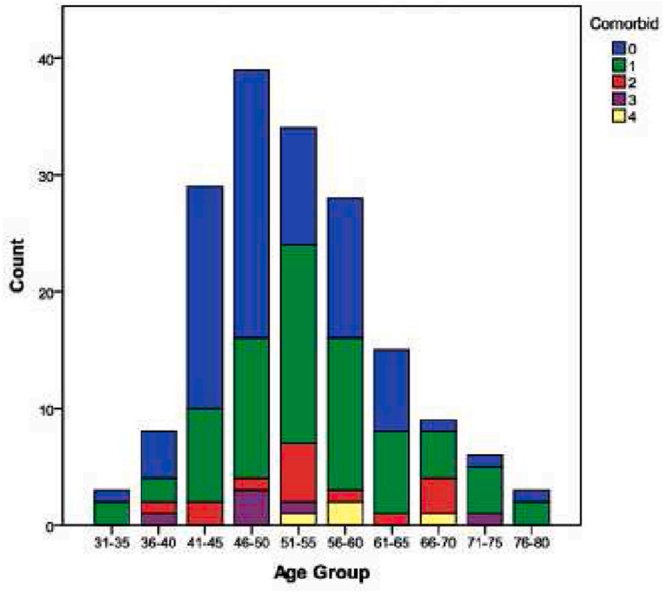

Fig. 1. Count of comorbid breast cancer patients by age group.

Table 8
Marital status by age group.

Age Group	Number of Comorbidities			Total Patients
	Single	Widow	Married	
31–35	0	0	3	3
36–40	1	0	7	8
41–45	1	0	28	29
46–50	2	2	34	38
51–55	0	3	31	34
56–60	0	4	24	28
61–65	2	5	8	15
66–70	0	5	4	9
71–75	0	3	3	6
76–80	0	3	0	3
Total	6	25	142	173

3.3. Descriptive analysis of clinical examination (karnofsky index, body weight, height, BMI, and stages)

The Karnofsky (Performance Scale) Index allows patients to be classified as to their functional impairment. This can be used to compare the effectiveness of different therapies and assess the prognosis in individual patients. The lower the Karnofsky score, the worse the survival for most serious illnesses, including breast cancer.

The karnofsky index level, according to the patient's ability, is classified as follows. The patient can carry out everyday activities and work and does not need special care, given a score of 0.8–1. Patients unable to work but able to stay at home and take care of most personal needs were given a score of 0.5–0.7. Patients who cannot care for themselves, require equivalent institutional or hospital care, and disease that has progressed rapidly is assigned a score of 0–0.4. For details on each Karnofsky Index score, see Ref. [22]. Descriptive analysis of the Karnofsky index of breast cancer patients in this study is shown in Table 1.

The average Karnofsky index of the patient is 0.8, meaning that breast cancer patients who come for treatment for the first time can generally have normal activities, but there are some signs or symptoms of the disease. For patients with the worst condition, namely Karnofsky Index 0.3, the patient came for the first time for treatment with a severe disability, hospital admission is indicated, although death was not imminent.

Other clinical examinations are Bodyweight and Height. Bodyweight and height are related to the body mass index (BMI). The relationship of BMI with the risk of breast cancer was investigated by Montazeri et al. [23] He researched the contribution of BMI in cases of excess breast cancer. A case-control study was conducted to assess the relationship between anthropometric variables and breast cancer risk in Tehran, Iran. Her results showed that women with a BMI in the obese range had a threefold increased risk of breast cancer. Descriptive analysis of body weight and height of breast cancer patients in this study are shown in Table 1.

The patient's body mass index was obtained from body weight and height. The BMI calculation result shows that the average patient has a BMI of 23.89, so it can be concluded that the patients are slightly overweight. BMI values at ideal body weight are 18.5–22.9. However, there were also very underweight patients with a BMI of 13.51 and obese patients with a BMI of 56.

One crucial variable examined in this study is the stage of cancer. Data obtained from the patient's examination describes the stages into eight, namely stages 0, I, IIA, IIB, IIIA, IIIB, IIIC, and IV. However, the analysis presented in this study is only grouped into four stages based on the similarity of characteristics between adjacent stages. Stage 0 and I are made into stage 1, stage IIA and IIB are made into stage 2, stage IIIA, IIIB, and IIIC are made into stage 3, and stage 4.

The cancer stage is obtained from the TNM examination of patients at the beginning of treatment. The distribution of the number of patients by stage is shown in Table 9 and Graph in Fig. 2. The order of the most significant number of patients based on the initial examination was stage 3 (41.38%), stage 4 (29.89%), stage 2 (25.86%), and the least was stage 1 (2.87%).

Based on Table 9, the most significant number of groups is the 46–50 age group, stage 3, then the 51–55 age group, stage 3, then the 56–60 age group, also stage 3 for the distribution based on patient age. Based on these data, most of the patients who came for treatment for the first time were at an advanced stage.

Table 9
Stages by age group.

Age Group	Stages				Total Patients
	1	2	3	4	
31–35	0	0	2	1	3
36–40	0	3	2	3	8
41–45	0	9	8	12	29
46–50	1	8	19	11	39
51–55	3	9	14	8	34
56–60	1	9	13	5	28
61–65	0	2	6	7	15
66–70	0	4	4	1	9
71–75	0	0	3	3	6
76–80	0	1	1	1	3
Total	5	45	72	52	174

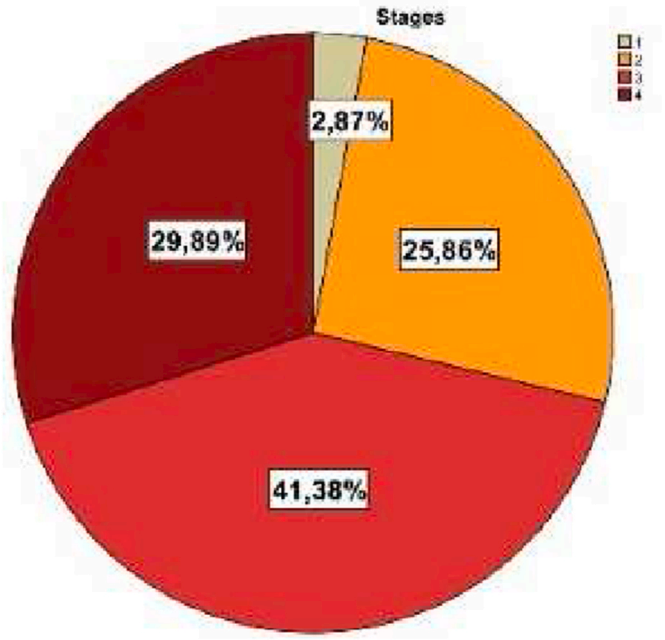

Fig. 2. Grouping patients by stages.

3.4. Descriptive analysis of pathology (ER, HER2, and PR)

Breast cancer has different biological characteristics, depending on the presence or absence of pathological aspects or receptors. Pathological aspects of patient data obtained are ER, HER2, and PR. A study conducted by Onitilo et al. [24] suggested comparing the clinicopathologic features and survival in the three breast cancer subtypes. They were defined by immunohistochemistry (IHC) expression of estrogen receptor (ER) or progesterone receptor (PR) and human epidermal growth factor receptor 2 (HER2). The results obtained in the study subtype comparison revealed statistically significant differences in outcomes. The triple-negative subtype has the worst overall and disease-free survival.

In this data study, Table 10 is the distribution of the number of patients based on aspects of pathology. Based on the table, the most significant number is the group with positive ER and PR, but negative HER2 is 68. There are three types of breast cancer based on the type of receptor. Positive breast cancer had hormone receptors (ER or PR positive or both); in this case, there were 101 patients or 62%. Breast cancer positive for HER2; in this case, there were 51 patients or 31%. As well as triple-negative breast cancer, in this case, there were 28 patients or 17%.

3.5. Correlation analysis of neutrophil with other laboratory examination

In the laboratory examination, correlation analysis is carried out to determine the effect of Neutrophil dynamic on other laboratory examination. The Kendall-Tau test performed correlation analysis between variables. Kendall-Tau test was chosen because it uses ordinal scale data, and not all are normally distributed. Based on the Kendall-Tau correlation test results, the variables that have the strongest correlation are leucocyte count, lymphocyte, and monocyte. All neutrophil correlations with laboratory results are shown in Table 11.

This situation does occur because leukocytes consist of lymphocytes, monocytes, eosinophils, neutrophils, and basophils. Leukocytes are equipped to escape from blood vessels and patrol the interstitial fluid to fight germs or viruses. If the body's condition is affected by cancer, the body will produce more leukocytes, especially neutrophils, so a strong positive correlation occurs between leukocytes and neutrophils.

Meanwhile, lymphocytes and monocytes had a strong negative correlation with neutrophils. The body will maintain a balance in the number of leukocytes by reducing lymphocytes and monocytes.

Neutrophils correlated strongly with thrombocytes at the 0.05 level. This situation is caused because cancer stimulates the formation of thrombocytes to protect the tumor from NK cells and TNF-α. In addition, thrombocytes have an essential angiogenesis protein so that the spread and progression of cancer increases. So that, the higher the neutrophils level due to cancer, the higher the thrombocytes level in the blood. Albumin examination is a simple method to estimate the function of proteins in the body. Serum albumin is commonly used to assess nutritional status, disease severity, disease progression, and prognosis. Malnutrition and inflammation due to cancer suppress albumin synthesis. So that albumin is also negatively correlated with neutrophils at the 0.05 level. Albumin examination has been investigated and combined with C reactive protein as an objective assessment of carcinoma patients, namely the Glasgow prognostic score [25].

3.6. Correlation analysis of neutrophil with socio-demographic (age, comorbidity, and marital status)

The correlation of neutrophils with Socio-Demographic factors is shown in Table 12. The correlation between neutrophils and human age has been studied previously.

Wenisch et al. [26] investigated the effect of human age on neutrophil function. Their results found a decrease in the phagocytic ability of neutrophils, which was associated with an increase in basal intracellular calcium levels and a decrease in age-dependent hexose transport. In addition, they found a decreasing trend of chemotaxis with increasing age. Meanwhile, studies related to the number of neutrophils associated with age were carried out by Li et al. [27]. The results showed that the Neutrophil-Lymphocyte Ratio (NLR) was positively related to age. The oldest age group had the highest NLR and the youngest age group had the lowest NLR.

The findings of Li et al. are in contrast to the correlation between Neutrophils and Age in this study. In this study, the resulting correlation was negative, meaning that the older the patient, the lower the number of neutrophils. This difference relates to the research data taken. Li et al.'s data are data obtained from healthy people, while in this study, data were taken from people with cancer. Neutrophil correlation with other Socio-Demographic factors is not related, see Table 12.

Table 10
Count of Breast Cancer based on the type of receptor.

HER2	ER	PR		Total
		Negative	Positive	
Negative	Negative	28	0	28
	Positive	15	68	83
Positive	Negative	33	1	34
	Positive	2	15	17
Total		78	84	162

Table 11
Correlations of Neutrophil with other Laboratory Examination.

Neutrophil vs	Correlation Coefficient	Sig. (2-tailed)	N
Leucocyte Count	0.245[a]	0.000	172
HB	−0.030	0.563	172
Lymphocyte	−0.754[a]	0.000	172
Monocyte	−0.235[a]	0.000	172
Thrombocyte	0.110[b]	0.033	172
Random Blood Glucose	−0.017	0.747	161
SGOT (ALT)	0.044	0.397	171
SGPT (ALT)	−0.095	0.069	171
Creatinine	0,060	0.246	172
Albumin	−0.144[b]	0.023	116

[a] Correlation is significant at the 0.01 level (2-tailed).
[b] Correlation is significant at the 0.05 level (2-tailed).

Table 12
Correlations of neutrophil with socio-demographic.

Neutrophil vs	Correlation Coefficient	Sig. (2-tailed)	N
Age at Diagnosis	−0.127[a]	0.015	172
Comorbid	−0.058	0.328	172
Marital Status	0.073	0.240	171

[a] Correlation is significant at the 0.05 level (2-tailed).

3.7. Correlation analysis of neutrophil with clinical examination (karnofsky index, body weight, height, BMI, and stages)

The correlation results are shown in the table in Table 13. The results of the analysis show that the only clinical examination variable that is strongly correlated with neutrophils is Height. This is a new finding that has never been studied before. Although the correlation is significant at the 0.05 level, it can be concluded that there is a positive correlation between patient height and neutrophil count based on the data of this study.

The correlation between neutrophils, in this case NLR and cancer stage, has been found in the research of Elyasina et al. [28]. Based on his research obtained, as the NLR increases, the stage increases as well. These results cannot be known in this study because the data used are only baseline data. There is no actual staging data for patients undergoing chemotherapy. This deficiency is an open problem in this study.

3.8. Correlation analysis of neutrophil with pathology (ER, HER2, and PR)

This section discusses the correlation of Neutrophils with Pathology. The data included in this analysis were ER, PR, and HER2. Correlation between these variables and Neutrophils was checked using the Chi-Square method. The Chi-Square method is carried out with the consideration that the type of data being correlated is nominal. The hypothesis used in this Chi-Square test:

H_0: There is no relationship between a variable with the Neutrophils.
H_a: There is a relationship between a variable with the Neutrophils.

Decision-making in the chi-square test can be done by looking at the value of Asymptotic Significance (2-sided) with a critical limit of 0.05. If the value is less than 0.05, then H_0 is rejected and H_a is accepted. Conversely, if the value is more than 0.05, H_0 is accepted, and H_a is rejected.

Based on the chi-square test table for the three variables, the value of the variable with an Asymptotic Significance value less than 0.05 does not exist, see Table 14. It means that H_0 is accepted and H_a is rejected, so it can be concluded that there is no relationship between these variables and the neutrophils.

4. Conclusion

The data description analysis results showed the characteristics of breast cancer patients who were outpatient at dr. Sardjito General Hospital. The data analyzed showed that the general description of breast cancer patients treated had normal laboratory results, except for neutrophils and SGOT in the stage 4 group. The age distribution of patients was mainly in the productive age. Most of the patients who received treatment for the first time were in an advanced stage, although they could still carry out their daily activities. The most common type of breast cancer is ER+/PR + breast cancer. The results of the descriptive analysis are significant to determine patient characteristics and treatment steps that can be taken.

Patient characteristics are used to anticipate the onset of neutropenia after chemotherapy treatment. The correlation of the data obtained shows the relationship between neutrophils and other data variables. The correlation of neutrophils with other laboratory tests, neutrophils with Socio-Demographic, neutrophils with clinical examination, and neutrophils with pathological tests are helpful for medical personnel to determine the next treatment step. The existence of this analysis is expected to anticipate the worst possible occurrence of neutropenia. In this study, variables closely related to neutrophils included leucocyte count, lymphocyte, monocyte, albumin, age at first diagnosis, and height. These variables can be a severe concern of medical personnel before undergoing chemotherapy, especially lymphocytes, which have the largest (negative) correlation and can be an early sign of neutropenia.

Table 13
Correlations of neutrophil with clinical examination.

Neutrophil vs	Correlation Coefficient	Sig. (2-tailed)	N
Karnofsky Index	−0.065	0.397	171
Body Weight	0.033	0.665	170
Height	0.153[a]	0.047	170
Stages	0.139	0.069	172
BMI_Scale	−0.048	0.536	170

[a] Correlation is significant at the 0.05 level (2-tailed).

Table 14
Correlations of neutrophil with pathology.

Varia-bles	Value	df	Asymptotic Significance (2-sided)	Valid Cases
ER	129.327	132	0.550	161
PR	134.951	132	0.412	161
HER2	136.357	132	0.380	161

Provenance and peer review

Not commissioned, externally peer-reviewed.

Ethical approval

All human studies were performed according to the guidelines and monitoring activities. This study has met the Ethical Clearance of Medical and Health Research Ethics Committee (MHREC) Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada – dr. Sardjito General Hospital (Ref: KE/FK/0444/EC/2020).

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Author contribution

All authors contributed to the conception and design of the study. The preparation and data collection was carried out by the Cancer Registry led by Susanna Hilda Hutajulu and Ibnu Purwanto. The draft script was written by M. Ivan Ariful Fathoni, as well as a data analyzer. The review of the contents of the article was carried out by Gunardi and Fajar Adi Kusumo. All authors comment on previous versions of the manuscript and approve the final manuscript.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Registration of research studies

1. Name of the registry: Forum for Ethical Review Committees in Asia

and the Western Pacific (FERCAP)

2. Unique Identifying number or registration ID: KE/FK/0444/EC/2020.

3. Hyperlink to your specific registration (must be publicly accessible and will be checked): http://komisietik.fk.ugm.ac.id/validasi (Validation number: 5ef193c38424f)

Consent

Yes, informed consent form and patient information sheet are made available in Indonesian for all the participants.

Guarantor

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Appendix A. Supplementary data

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