



THE RELATIONSHIP BETWEEN CHEMOTHERAPY AND INCIDENCE OF ANEMIA IN BREAST CANCER PATIENTS AT CUT MEUTIA GENERAL HOSPITAL, NORTH ACEH

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Abstract

Introduction: Chemotherapy is the most common treatment before and after surgery to treat breast cancer patients, anemia is the most common side effect of chemotherapy, and transfusion is the most common side effect of chemotherapy treatment. The increase in the hemoglobin levels can be achieved quickly, but the side effects that may occur are also not small. This study aims to determine the relationship between chemotherapy and the incidence of anemia in breast cancer patients at the Cut Meutia General Hospital, North Aceh **Methods:** The type of research is analytical, and the method uses a cross-sectional design carried out from October 2021 to March 2022. A total sample of 45 breast cancer patients was taken by total sampling that met the inclusion and exclusion criteria.

Results: The results showed that there were 15 people (16.00) of chemotherapy drugs using the platinum base and antrasiklin 30 people (26.50). Man Whitney test results obtained $p < 0.007$ indicates that the value (p) < 0.05 ($p = 0.000$).

Conclusion: So this study concludes that there is a relationship between chemotherapy and the incidence of anemia in breast cancer patients at RSCM Aceh Utara.

Keywords: *Chemotherapy, anemia, breast cancer*

Introduction

Breast cancer is the most common cancer in women and the second highest cause of death after lung cancer. The low level of knowledge in prevention and delays in treatment means that many people will only go to the hospital when they are in severe condition². This is one indicator of the high number of cases of death in breast cancer patients². Chemotherapy is an effective therapeutic modality in cancer treatment, working by destroying rapidly proliferating cells. During chemotherapy, neoplastic cells are more likely to die than normal cells. Chemotherapy in cancer patients is often accompanied by

bone marrow aplasia manifested by anemia, leukopenia, thrombocytopenia, or a combination of these conditions. Patients' quality of life is reduced as result of these complications, which increase morbidity and mortality. Chemotherapy can cause anemia through inhibition of normal hematopoiesis and cytokine action. Chemotherapeutic agents cause anemia directly by interfering with hematopoiesis, including the synthesis of red blood cell precursors in the bone marrow³.

Some researchers have reported that anthracycline-based chemotherapy can cause anemia in 4% -

63% of cases, depending on the regimen and the administration cycle. In breast cancer cases receiving anthracycline-based chemotherapy, approximately 40% develop moderate to severe anemia, and 61.9% developed moderate to severe anemia with pre-chemo treatment⁴. In chemotherapy, there is a process of blood transfusion for patients with cancer. Transfusion is the process of giving blood to patients through an infusion tube connected to a needle inserted into a vein. The type and amount of blood being transfused depend on the patient's condition⁵.

Anemia is the result of the failure of the erythropoiesis process caused by cancer or chemotherapy, which is called Cancer-related Anemia (CRA). Anemia was defined as a decrease in one or more red blood cell parameters: hemoglobin concentration, hematocrit, or erythrocyte count. According to the Chinese Society of Clinical Oncology, anemia was defined as Hb 10 g/dl or hematocrit 30%⁶.

Base on the description above, it is necessary to conduct further research to find out the relationship between chemotherapy and the incidence of anemia in breast cancer patients at the Cut Meutia General Hospital, Aceh Utara.

Method s

In this research, the researcher used analytical method by using *cross sectional* and was conducted in October 2021- March 2022 for her research. There was 45 patient of breast cancer which Taken by total sampling that meets the inclusion and exclusion criteria. The independent variable in this study was chemotherapy. The dependent variable in this study was anemia.

Procedur e

For the instrument, this research used Instrumen yang digunakan pada penelitian ini using medical records of breast cancer patients who experienced anemia after chemotherapy at the Cut Meutia General Hospital, North Aceh in 2020. Univariate data

analysis aimed at identifying the stage and description of breast cancer patients undergoing chemotherapy. Bivariate data analysis aims to determine whether or not there is a relationship between chemotherapy and the incidence of anemia in breast cancer patients at the Cut Meutia General Hospital, Aceh Utara. The analysis used Mann-Whitney test data analysis. The results of the study were considered significant if the p -value < 0.05 .

Result s

As we can see for the stadium levels in table 4.1, the most out of 45 patients were patients with stage 4 levels, namely 23 patients (n), or 51, 1%. And cancer patients with the least stage of the disease are stage 2. Ie as many as two patients (n) or by 2.2% of 45 patients. In table 4.2, it can be seen that the type of chemotherapy drug with the highest frequency is the anthracycline type, which is 30 patients or equal to (66.7%). While for the Platinum type of chemotherapy, it is as many as 15 patients or as many as (33.3%).

For table 4.3 the data on the incidence of anemia to the level of occurrence, the highest frequency distribution is in the medium level with a percentage (46.7%). or as many as 21 patients out of a total of 45 patients. So from these data, it can be seen the characteristics of the stage level of breast cancer patients at the Cut Meutia Hospital. And it can be concluded that the general description of the incidence of breast cancer from patients undergoing chemotherapy at the Cut Meutia Hospital, which is often founded in patients with stage 3 and stage 4 levels.

For 4.4 yaitu data on the relationship between the type of chemotherapy and the level of anemia, it is known that there are 15 patients with platinum chemotherapy, one patient (6.7%) does not have anemia, and there are four patients (26.7%). There were nine patients (60%). Among the patients with severe anemia, only one (6.7%) was on platinum chemotherapy, and no patient had very severe anemia. Beside, for the type of anthracycline drug from the data in this table it was found that there were no patients who did not experience anemia. There were four patients with mild anemia (13.3%) and 12 patients with moderate anemia (40%) in the study. And there were 12 patients (40%) with severe anemia, and 2 patients (6.7%) with anthracycline chemotherapy found with very severe anemia. Then the Mann-Whitney test was carried out to see the relationship between the type of chemotherapy and the incidence of anemia as shown in table 4.5

The secondary data that has been obtained by the Mann-Whitney test is obtained $p < 0.007$. And this shows that $p < 0.05$. Then H_0 is rejected and H_a is accepted. Where from this it can be seen that there is a relationship between the type of chemotherapy drug and the incidence of anemia in breast cancer patients.

Discussion

Frequency of breast cancer stage

Based on the results of the study in table 4.1, it shows the distribution of stage levels, where the majority of breast cancer patients at stage 4 were 23 patients or (51.1%). Followed by stage 3 which is as many as 20 patients or (44.4%) this shows that patients undergoing chemotherapy treatment have entered an advanced stage. and the least breast cancer patients were stage 2, namely 2 patients or (2.2%) of 45 patients. From This study also shows a pattern that most breast cancer patients are patients with advanced stages (3 and 4), this happens because most breast cancer patients come to the hospital for examination when they are at stage 3, due to the symptoms that have started to be felt by the patient. patients, compared to when they were in the early stages.

Frequency Type Of Chemotherapy

Based on table 4.2 in this study it was found that the type of cytostatic chemotherapy drug that was most often used was anthracycline, this was done because anthracyclines were anti-cancer with the highest

level of effectiveness among other types of anti-cancer⁷. Anthracycline chemotherapy is also preferred, because

in this type there are various types of drugs that can be used in the process of treating breast cancer. Clinically the most important anthracyclines are doxorubicin, daunorubicin, epirubicin, and idarubicin⁸ And this can be seen in table 4.2, it was found that 30 patients or (66.7%) were given anthracycline-type chemotherapy. While the type of chemotherapy Devirat Platinum only got as many as 15 patients (33.3%). This is because platinum chemotherapy drugs have two types of drugs, cisplatin and carboplatin. Anthracycline chemotherapy is the most widely used standard type of chemotherapy for breast cancer patients with a lower level of toxicity compared to other types of chemotherapy. Breasts⁹

The frequency of the incidence of anemia to its level

In a study conducted at the Cut Meutia Hospital for breast cancer patients, it was found that patients undergoing chemotherapy would experience side effects from a series of chemotherapy processes carried out. The results of the study indicate that anemia that occurs in breast cancer patients at the Cut Mutia Hospital has a relationship with the type of cytostatic chemotherapy given, and with varying levels, it can also be seen in table 4.3 that the distribution of data is found.

The incidence of anemia with a mild degree, which is worth 9.5-10.9 g/dl is equal to (17.8%) or as many as 8 patients, and the highest frequency is in the level of moderate-grade anemia, namely anemia with a value of 8-9.4 g/dl with a percentage of (46.7%) or as many as 21 patients out of a total of 45 patients. This is due to the increased incidence of mild and moderate anemia associated with the use of cytostatic chemotherapy drugs. Chemotherapy undertaken by cancer patients will have an effect on anemia as also found by Arifah¹⁰ in his research on the incidence of anemia in cancer patients who receive radiotherapy and/or chemotherapy will experience anemia. In the management of treatment in breast cancer patients there are several ways that are usually done, such as surgery, hormonal therapy, radiation therapy, and chemotherapy. The most common treatment for breast cancer patients is chemotherapy¹¹. One of them is cytostatic chemotherapy consisting of anthracycline and platinum types. The relationship between the type of chemotherapy and the level of anemia.

From table 4.4, the data on the relationship between the type of chemotherapy and the level of anemia, it is known that the type of chemotherapy using platinum contained 15 patients, 1 patient (6.7%) did not experience anemia, for the mild anemia level there were 4 patients (26.7). %. There were 9 patients (60%). For the level of severe anemia, there was 1 patient (6.7%), and there was no patient with very severe anemia on platinum chemotherapy.

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Types of anthracycline drugs from the data table 4.4 found that there were no patients who did not experience anemia, for the mild anemia level there were 4 patients (13.3%), for the moderate anemia level there were 12 patients (40%). And there were 12 patients (40%) with severe anemia, and 2 patients (6.7%) with anthracycline chemotherapy were found with very severe anemia.

From these results it was found that both types of cytostatic chemotherapy drugs can cause anemia in breast cancer patients. Other side effects were also found in patients after chemotherapy such as neuropathy which was studied by Faisel¹⁴.

Side effects of anthracycline and platinum derivat drugs also cause allergic reactions, loss of appetite, nausea, vomiting, fever, and high blood sugar levels¹⁵. In another study, it was also found that the effect of chemotherapy is not only anemia but also can cause the release of cytokine substances such as TNF (tumor necrosis factor), and can reduce body weight and muscle mass and also anemia, which causes patients with advanced cancer. seniors often experience fatigue¹⁶.

Anemia that occurs in breast cancer patients undergoing chemotherapy can also affect motivation and can even cause depression so that the motivation of patients to continue the chemotherapy process decreases¹⁶. The use of cytostatic chemotherapy can also cause side effects that not only attack cancer cells, but can also rapidly divide normal cells such as hair, bone marrow, and the gastrointestinal tract. Disrupted blood cell formation in the bone marrow will also lead to a decrease in the number of blood cells, and this will result in the emergence of various types of diseases such as infection, anemia and the risk of bleeding¹⁸.

Based on table 4.5 data from the Mann Whitney test, it can be concluded that the most widely used type of chemotherapy for breast cancer patients at RSUD Cut Meutia is anthracycline chemotherapy, with a mean rank value of 26.50 as many as 30 patients undergoing chemotherapy. From the Mann Whitney test, $p < 0.007$. And this shows that $p < 0.05$. Then H_0 is rejected and H_a is accepted. Where from this it can be seen that, there is a relationship between the type of chemotherapy drug and the incidence of anemia in breast cancer patients.

Clinically, the most important anthracycline is doxorubicin, which is a type of drug that works to slow down or stop the growth of cancer cells by blocking the topoisomerase type 2 enzyme, which is an enzyme that causes cancer cells to grow and grow larger, and daunorubicin. Its mechanism of action as an antineoplastic is thought to involve binding to DNA through the intercalation process between base pairs and

inhibition of DNA and RNA synthesis through topoisomerase II enzymes, namely by stabilizing the DNA-topoisomerase II complex, preventing the religation part of the ligation-religation reaction catalyzed by topoisomerase II, and the type of epirubicin which also works by inhibiting the topoisomerase II enzyme so that it will inhibit the process of cell division and DNA formation, and idarubicin¹⁷. And it can be seen in table 4.3 that 30 patients or (66.7%) were given anthracycline chemotherapy.

Meanwhile, platinum devirat chemotherapy was only obtained by 15 patients (33.3%). This is because platinum chemotherapy drugs have two types of drugs cisplatin and carboplatin. Cisplatin works by inhibiting the formation of cell DNA which will make cell growth slow and will also be able to stop the growth of cancer cells as well as the type of carboplatin also works by binding to DNA so that it will inhibit DNA transcription and also DNA synthesis. Anemia that occurs in cancer patients can cause fatigue.

Conclusions

The conclusions obtained from this study were: 1) All breast cancer patients in 2020 were female, namely 45 patients (100%), the majority of breast cancer patients in 2020 had moderate degree of anemia, namely 21 patients (46.7%), most breast cancer patients in 2020 experienced stage 4, namely 23 patients (51.1%). 2) Most breast cancer patients in 2020 received anthracycline type chemotherapy, as many as 30 patients (66.7%) while platinum type chemotherapy as many as 15 patients (33.3%). 3) The majority of breast cancer patients in 2020 had moderate degree of anemia, namely 21 patients (46.7%), 13 patients (28.9%) had severe anemia, 8 patients (17.8%) had mild anemia. , as many as 2 patients (4.4%) had very severe anemia. 4) There is a relationship between types of chemotherapy, namely Anthracycline, and Devirat platinum on the incidence of anemia in breast cancer patients. The type of drug that is most often used in patients suffering from breast cancer at the Cut Meutia Hospital is anthracycline type with a total of 30 patients, while for platinum chemotherapy types are as many as 15 patients or as much as 33.3%

Disclosure

The author declares no conflict of interest related to the material presented in this article.

Ethics Consideration



Ethics approval (No. 735//KEPK/FKUMSU/2019)

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Author Contribution

All of the authors equally contribute to the study from the conceptual framework, data gathering, and data analysis until reporting the study results through publication.

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Table 4. 1 Frequency of cancer stage

Mammary Ca Stage	Frequency (n=45)	Percentage (%)
Stage 2	2	4,4
Stage 3	20	44,4
Stage 4	23	51,1
Total	45	100,0

Table 4. 2 Frequency Type of chemotherapy

Type of chemotherapy	Frequency (n=45)	Percentage (%)
Platinum based	15	33,3
Antrasiklin based	30	66,7
Total	45	

Table 4. 3 Frequency of anemia in terms of levels

Degree of Anemia	Frequency (n=45)	Percentage (%)
Normal	1	2,2
Light	8	17,8
Mediu	21	46,7
m	13	28,9
Weight	2	4,4
Very Heavy	45	100,0
Total		

Table 4. 4 The relationship between types of chemotherapy and the level of anemia.

Jenis Kemoterapi	Anemia					TOTAL
	Normal	Light	Medium	Weight	Heavy	
Platinum	1 6,7%	4 26,7%	9 60,0%	1 6,7%	0 0%	15 100,0%
Antrasiklin	0 0%	4 13,3%	12 40,0%	12 40,0%	2 6,7%	30 100%
Total	1 2,2%	8 17,8%	21 46,7%	13 28,9%	2 4,4%	45 100%

Table 4. 5 Mann Whitney Test Results

	Type of chemotherapy	n	Mean Rank	Sum Of Ranks	P value
Anemia	Platinum based	15	16,00	240,00	,007
	Antrasiklin based	30	26,50	795,00	



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