Incidence and Risk Factors of Anemia in Breast Cancer Patients having Chemotherapy in Dr. Moewardi Hospital

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Abstract—The prevalence of breast cancer at Dr. Moewardi Hospital is currently ranked first on oncology cases at 18.92%. Chemotherapy is effective in fighting cancer cells, reducing tumor size, and giving a good prognosis in patients. Side effects of chemotherapy are indigestion with a manifestation of decreased food intake which has an impact on nutritional status and hemoglobin levels. Risk factors causing anemia are chemotherapy cycle, body mass index (BMI), age and initial hemoglobin. Objective: To determine the predictive factors of anemia caused by chemotherapy. Method: observational with cross sectional design. Subjects of the study were 115 patients aged 30-60 years who were taken randomly. Multivariate analysis with logistic regression to find the basic risk factors for anemia. Results: Anemia prevalence was 87%. The occurrence of anemia was significantly associated with four risk factors: Chemotherapy cycle (OR=0.282; 95% CI=0.078-1.015;p=0.053), BMI (OR = 7.544; 95% CI=0.962-59.174;p=0.054), Age (OR=0.925; 95% CI=0.396-2.180;p=0.865), Hb at baseline (OR=2.0; 95% CI=1.539-2.599;p=0.001). Conclusion: Identification of chemotherapy risk factors such as chemotherapy cycles, age, BMI, and Hb levels are important for patients at risk for anemia. These risk factors Hb at baseline are significantly associated with anemia in chemotherapy patients.

Keywords—anemia; breast cancer; chemotherapy

I. INTRODUCTION

Cancer is one of the main causes of death worldwide [1]. Cancer is an abnormal growth of body tissue cells that turn malignant and these cells can grow further and spread to other parts of the body that cause death [2]. Cancer cells do not die, but grow continuously and are invasive, so they attack normal cells nearby [3].

One type of cancer is breast cancer, which is a malignant tumor formed from breast cells that grow and develop uncontrollably so that it can spread between tissues near the breast or to other parts of the body [4]. According to the International Agency for Research on Cancer (IARC), it is known that in 2012 there were 14,067,894 new cases of cancer and 8,201,575 cancer deaths worldwide [5]. Breast cancer, prostate cancer, and lung cancer are cancers with the highest

percentage of new cases, namely 43.3%, 30.7% and 23.1%. Meanwhile, lung cancer and breast cancer are the leading cause of death from cancer [6].

The prevalence of cancer in Indonesia is 1.4% or around 347,792 people. In Central Java cases of cancer by 2.1% with the highest prevalence in women is breast cancer and cervical cancer [7]. Based on the top ten diagnoses of disease in RSUD Dr Moewardi the incidence of breast cancer is currently ranked first on oncology cases in July, August, September 2017 at 18.92% [8]. The high prevalence of breast cancer needs to be observed with precautionary measures and early detection by health care providers.

Cancer therapy itself is one of them with chemotherapy. Chemotherapy is very effective in fighting cancer cells, reducing tumor size, and providing a good prognosis in patients [9]. Chemotherapy aims to stop the growth of cancer cells, but has side effects of digestive disorders with a manifestation of decreased food intake which has an impact on nutritional status, hemoglobin levels and quality of life [10]. The chemotherapy regimen can also cause a decrease in hematopoietic cells, especially against hemoglobin (Hb), neutrophils and thrombocytes [11]. Hb levels are a factor in the occurrence of anemia in chemotherapy patients [12].

Anemia defined by hemoglobin concentration is lower than 12 gr/dl [13]. Hemoglobin levels are routinely determined before chemotherapy. Risk factors for anemia observed include the chemotherapy cycle, age, body mass index and initial hemoglobin level [14].

II. METHOD

The study was an observational study with cross sectional design. The population in this study was breast cancer patients who underwent chemotherapy and had met the criteria for inclusion and exclusion. Criteria inclusion included women aged 30 - 60 years, undergoing chemotherapy cycles 1-6 times and stages 1 and 2. Exclusion criteria Breast cancer with metastases, breast cancer with complications of other diseases, Patients who have delayed chemotherapy.

A. Sample

The subjects of this study were breast cancer patients who underwent chemotherapy as many as 115 people who were taken simple randomly

B. Data Collection

Questionnaires and interviews were used to see patient characteristics and information related to therapy. Anthropometric measurements include body weight and height to calculate body mass index (BMI). Examination of hemoglobin levels before and after chemotherapy with the cyanmethemoglobin method.

C. Data Analysis

The SPSS statistics version 16 computer program is used as a tool to analyze statistical tests. Data Characteristics of subjects are presented in the form of descriptive mean and standard deviation (SD). Univariate analysis to determine the relationship between variables is done by Chi Square test. Multivariate analysis using logistic regression was presented in the form of an odd ratio (OR) with 95% confidence interval (CI) $p < 0.05$.

Results

Characteristics of subjects are presented in descriptive form in the form of mean and standard deviation (SD). Characteristics of subjects can be seen in table 1.

TABLE I. SUBJECT CHARACTERISTICS

Variable	Mean±SD
BMI (kg / m ²)	22.035±4.252
Chemotherapy cycle (x)	2.70± 1.408
Age	48.84± 7.636
Initial Hb level	11.940± 0.861
Hb level	11.220± 1.130

D. Prevalence of Anemia

Before starting chemotherapy, the average hemoglobin level is 11.9 g / dl. During chemotherapy 75.7% had anemia with an average Hb level of 11.2 g / dl. The prevalence of anemia in table 2.

TABLE II. PREVALENCE OF ANEMIA

Criteria	N	%
Anemia	87	75.7
Not anemia	28	24.3

E. Predictive Factors

Some predictive factors for anemia are the cycle of chemotherapy, body mass index, age, and initial hemoglobin. The results of univariate analysis were significant factors against the risk of initial Hb anemia. Data is summarized in table 3.

TABLE III. UNIVARIATE ANALYSIS OF INCIDENCE OF ANEMIA

Variable	Incidence		P
	Anemia	Not Anemia	
Chemotherapy cycle < 3 > 3	26 51	3 25	0.042
BMI <25 >25	68 19	27 1	0.027
Age < 50 >50	45 42	13 14	0.865
Initial Hb <12 >12	59 28	0 28	0.001

TABLE IV. MULTIVARIATE ANALYSIS OF THE RISK OF ANEMIA

Variable	OR	95% CI	P Value
Chemotherapy cycle	0.282	0.078-1.015	0.053
BMI	7.544	0.962-59.174	0.054
Age	0.925	0.396-2.180	0.865
Initial Hb	2.0	1.539-2.599	0.001*

III. DISCUSSION

This study describes anemia often occurring at the beginning of chemotherapy by 75.7%. This prevalence is in accordance with the results of the ECAS study that anemia occurs (70%) [14]. Anemia is defined as Hb levels lower than 11 gr/dl with a cutoff value of 12 gr / dl. Continuous variables identified as risk factors for anemia include chemotherapy cycle > 3, BMI <25 kg / m², Age > 50 years and initial Hemoglobin <12 gr/dl. Low hemoglobin levels are often associated with a type of radical mastectomy surgery where Hb levels are lower than breast conservation surgery due to blood loss during surgery as described by Denison [15]. In this study, unrelated BMI related to anemia predictive factor is supported by research that explains that bone marrow atrophy occurs in some elderly people [16-19].

However, the impact of BMI on the development of anemia remains to be considered in relation to the standard dose of chemotherapy drugs which consider the body surface area and low body mass index less accurate for chemotherapy [20].

The results of the study of the incidence of anemia associated with risk factors: Chemotherapy cycle: OR = 0.282; 95% CI = 0.078-1.015; $p = 0.053$, BMI: OR 7.544; 95% CI = 0.962-59.174; $p = 0.054$, Age: OR = 0.925; 95% CI = 0.396-2.180; $p = 0.865$, initial Hb: OR = 2.0; 95% CI = 1,539-2,599; $p = 0.001$.

In this context, early identification of risk factors for anemia can improve the quality of life of breast cancer patients better. It is hoped that with a better quality of life, success can improve the success of cancer therapy and reduce mortality [21].

IV. CONCLUSIONS

The implications of this study should be to identify earlier factors: the cycle of chemotherapy, BMI, age, and initial hemoglobin in patients at risk of anemia. suggestions for the implications of this study should be that patients undergoing chemotherapy are given nutrition education to increase food consumption which can increase hemoglobine levels and prevent further anemia.

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