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Research Article

# THE EFFECT OF DRUG-RELATED PROBLEMS ON THE DECREASE OF HEMOGLOBINE LEVELS IN CANCER PATIENTS

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**ABSTRACT**

**Objectives**: The aim of this study was to determine the effect of drug-related problems (DRPs) on the decrease in hemoglobin levels in cancer patients.

**Methods:** This study was a prospective cross-sectional study on seven cancer patients at Haji Adam Malik (HAM) Hospital. Patients aged 35 years old and above with any cancer type and stage from April 2017 to July 2017 were included in the study at HAM Hospital Medan. DRPs were analyzed using DRP Registration Form V7.0 Pharmaceutical Care Network Europe. The obtain data were tested using Chi-square test ($p<0.05$ is considered significant).

**Results:** The result showed that based on the characteristics of age, the largest group was 46–55 years, and based on the suffered stage, the most stage was Stage III with 57.14%. Two DRPs were identified in seven patients. The most prevalent DRPs were the interaction of drug (100%) followed by unwanted drug reaction (85.71%) and the risk of DRPs was decreasing the hemoglobin levels in cancer patients from the median-to-moderate levels.

**Conclusion:** Drug-related problems are common among cancer patients. Interaction of drug problems and unwanted drug reaction were the most common types of DRPs among cancer patients, and showed that there was a relationship of DRPs on the decrease in hemoglobin levels.

**Keywords:** Doxorubicin, Drug-related problems, Hemoglobin.

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## INTRODUCTION

Cancer is a disease caused by the growth of cells of body tissue that is not normal. Cancer cells will attack and destroy other biological tissues, either by direct growth in adjacent tissue (invasion) or by migrating cells to distant sites (metastases) [1].

Cancer has become a global burden because of the aging, increased adoption of cancer-causing behaviors particularly smoking and exposure to triggering factors such as chemicals, radiations, unhealthy eating habits, and a sedentary lifestyle. Different modalities for treatment of cancer include radiation, surgery, chemotherapy, hormonal therapy, immunotherapy, biologic therapy, and cryosurgery [2]. The treatments with cancer chemotherapeutic drugs are often associated with a variety of serious and non-serious drug-related problems (DRPs). The most common side effect of chemotherapy administration is nausea with or without vomiting, diarrhea, alopecia, darkening of skin and nails, darkening of the injection site, myelosuppression, mucositis, neuropathy, cardiomyopathy, and electrolyte imbalance [3].

Drugs are widely used because of their ability to affect the biological systems of the body. The use of these drugs may also certain unwanted or unintended effects. Each time a patient is exposed to a drug it cannot be certained about the unwanted effects of the product. However, we can learn from previous experience where patients have been exposed to the similar drug [4].

DRPs are defined as an event or circumstance involving medication therapy that actually or potentially interferes with an optimum outcome for a specific patient [5]. One of the effects of chemotherapy is the formation of free radicals doxorubicin. Excessive free radicals are toxic and will damage normal cells including bone marrow cells resulting in suppression of the red blood cell forming system that produces hemoglobin [6].

Despite the significance of DRPs, published information on DRPs in the patients with cancer is frequent. This study is part of our continuous effort to review the updated data on the common DRP detected by pharmacists in cancer patients receiving chemotherapy, the common drugs involved, and the common actions taken to resolve the DRPs detected.

## METHODS

### Study design and patients

This was a prospective cross-sectional study on cancer patients. Patients aged 35 years old and above with any cancer type and stage from April 2017 to July 2017 were included in the study. Patients were excluded from the study if the reports were incomplete.

### Data collection

Patients' demographic data, medical information, medication list, number and type of DRPs detected, drugs involved, and actions taken to resolve DRPs were retrieved from the database at RSUP Haji Adam Malik.

### Classification of drug-related problems

The American Society of Hospital Pharmacists classification system for DRP was modified for this study [7]. DRPs identified by pharmacists were documented and categorized into some categories, namely, indication without drug or more medication required, drug without indication or discontinuation of medication required, wrong drug or inappropriate drug, overdose or duplication, underdose, non-adherence, adverse drug events, potential drug-drug interaction, and others.

### Statistical analysis

Chi-square tests were performed to examine the associations of patient factors such as age, gender, number of chronic medications, and number of comorbid conditions with the presence or absence of DRPs, and the effects of related factors on DRP were also evaluated by it. Statistical significance was set at $p\leq0.05$, and all statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) version 21.

## RESULTS

There were 7 patients who participated in this study from April 2017 to July 2017. The sex of cancer patients consisted of male patients as many

**Table 1: Patient baseline characteristics**

| Patient demographic characteristics | Number of patients (%) |
|---|---|
| Gender | |
| Women | 6 (85.71) |
| Man | 1 (14.29) |
| Age | |
| 35–45 | 2 (28.57) |
| 46–55 | 4 (57.14) |
| 56–65 | 1 (14.28) |
| Stage | |
| III | 4 (57.14) |
| IV | 3 (42.85) |
| Cycle | |
| I-IV | 3 (42.85) |
| V-VIII | 4 (57.14) |

as 1 patient (14.29%) and female patients as many as 6 patients (85.71%). Most cancer patients between the ages of 46–55 years, that is, 4 patients (57.14%), age between 35 and 45 years, that is, 2 patients (28.57%), and the number of patients aged between 56 and 65 years, that is, 1 patient (14.28%). The number of Stage III cancer patients were 4 patients (57.14%), and Stage IV were 3 patients (42.85%). That the cancer patients who underwent the chemotherapy Cycle I–IV were 3 patients (42.85%), and the chemotherapy Cycle V–VIII were 4 patients (57.14%).

**Drug-related problems**

The most common DRPs criteria were medication interaction with treatment were 7 patients (100.00%), and DRPs on unwanted drug reactions were 6 patients (85.71%).

## DISCUSSION

Drug-related problems are prevalent among cancer patients receiving chemotherapy as at least one DRP was detected in 100% of the patients in this study. This finding is consistent with the study undertaken by Yeoh *et al*. on the local patients with cancer, which reported 91.5% of the patients with at least one DRPs.

In aging there is a decrease in the function of cells and tissues in maintaining the structure and repair itself so the accumulation of cell damage. Hence, gradually the immune system decreases, so there are many metabolic distortions that cause the emergence of degenerative diseases and age-related diseases such as cancer. The most cancer patients first detected is in Stage III. This is probably due to the patient's unaware of cancer characteristics and the absence of the patient's perceived grievances during Stage I and Stage II [9].

The occurrence of decreased hemoglobin levels due to doxorubicin chemotherapy is the formation of free radicals doxorubicin. Excessive free radicals are toxic that will damage normal cells including bone marrow cells resulting in suppression of blood cell forming systems that produce hemoglobin [6].

Malignancy causes the life of red blood cells to be shorter, causing the hormone-forming erythrocytes (red blood cells) to decrease, resulting in a decrease in hemoglobin [10]. This decrease in hemoglobin levels describes the effect of doxorubicin and its combination during chemotherapy, in addition to cancer malignancy is also a factor in decreasing hemoglobin levels [11].

## CONCLUSION

DRPs are significant among patients receiving chemotherapy. Potential drug-drug interaction, adverse drug events, and cancer's cycle were the most common DRPs detected in this study. The common actions taken to resolve the detected DRPs include increased monitoring and patient education. Characterizing the common DRPs detected, the study provides health-care professionals greater insight into the DRP affecting patients with cancer and hopes to increase awareness, promote early detection of DRPs, and guide the formulation of appropriate DRPs management strategies, thereby improving the patient care at risk for DRPs.

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