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Cemotherapi Induce Alopecia Due Carboplatin-Paclitaxel Regiment

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Abstract

Cervical cancer, breast cancer, and ovarian cancer are the most prevalent cancers seen at Dr. Moewardi Surakarta Hospital, and carboplatin-paclitaxel chemotherapy is prescribed in 45% of incidents. Alopecia was identical to chemotherapy.

Methods

The study aims to identify the type, percentage, and severity of Adverse Drug Reactions to alopecia in RSUD Dr. Moewardi Surakarta. This was an observational research using a cross-sectional design with prospective data searches. This study's inclusion criteria were adults with

cancer who received carboplatin-paclitaxel treatment and were willing to participate in the research. The data on ADRs and the severity of alopecia will be described as a percentage.

Result

Alopecia was the most common ADR in participants taking carboplatin-paclitaxel in this research. 100% of patients had alopecia due to the carboplatin-paclitaxel regimen. The current study measured the severity by CTCAE with ADR values at grades 2 (100%).

Keywords: Cemotherapi, ADRs, CTCAE, Indonesia

Introduction

Cancer is a condition defined by the unregulated proliferation and spread of abnormal cells (Workalemahu *et al.*, 2020) [14]. GLOBOCAN 2020 projects that 19.3 million patients will be diagnosed with cancer, with approximately 10.0 million individuals dying. Cancer mortality rates were high (Sung *et al.*, 2021). Cancer has a variety of treatments, including radiation, chemotherapy, and surgery. Chemotherapy's objective is to decrease tumour multiplication and cell proliferation, hence preventing metastasis and invasion (Amjad *et al.*, 2023) [1]. According to research conducted in 185 countries in 2018, there were 18.1 million cancer patients and 9.6 million deaths. Cancer is a disease with a high fatality rate, hence developing cancer treatments is a top priority. Standard antineoplastic medicines, particularly cytotoxic chemotherapy, include the risk of side effects. As the number of new antineoplastics grows, so does the diversity of ADR. ADRs are influenced by the types of antineoplastics used, the frequency of usage, ethnic diversity, and illness severity.

Carboplatin-paclitaxel is a chemotherapy regimen that treats lung cancer, ovarian cancer, breast cancer, cervical cancer, and digestive system cancer (BC Cancer Agency, 2019) [3]. Edema, headache, insomnia, asthenia, fatigue, pain, back pain, alopecia, hypokalaemia, dyspepsia, anorexia, constipation, diarrhea, nausea, vomiting, mucositis, stomatitis, anemia, granulocytopenia, leukopenia, neutropenia, thrombocytopenia, fever, infection, myalgia, motor neuropathy, sensory neuropathy, paresthesias, peripheral neuropathy, and dyspnea were ADRs that caused by carboplatin-paclitaxel with percentage more than 10%.

CIA is a prevalent and feared side effect of systemic cytotoxic medicines for both male and female patients. Cytotoxic medications destroy rapidly growing cells, including cancer cells and healthy cells such as hematopoietic cells, intestinal epithelial cells, and hair follicle (HF) keratinocytes, during the anagen phase. Cytotoxic medicines primarily target the proliferative keratinocytes and pigmentary system at the bottom of the anagen HF, causing fast death and hair shaft breakage/shedding. Because 90% of scalp hair follicles are in the growth phase, chemotherapy can cause significant hair loss within weeks. The risk of CIA and hair loss varies according to the medicine, dosage, frequency, duration, and mode of administration. CIA is more common with antimicrotubular drugs (e.g., paclitaxel), topoisomerase inhibitors (e.g., doxorubicin), alkylators (e.g., cyclophosphamide), and antimetabolites (e.g., 5-fluorouracil and leucovorin). (Wikramanayake *et al.*, 2023).

The carboplatin-paclitaxel regimen can be used to treat a variety of cancers. There is minimal data on ADRs alopecia in patients who are treated with a carboplatin-paclitaxel combination; therefore, more research is necessary. This study can reveal information regarding the percentage of patients who have alopecia and the severity caused by carboplatin-paclitaxel at Dr. Hospital. Moewardi Surakarta, to predict side effects throughout the treatment period and improve patient's quality of life.

Materials and Methods

This study employed an observational cross-sectional design with prospective data searches to create a cohort of cancer patients who received the carboplatin-paclitaxel regimen at Dr. Hospital Moewardi Surakarta. Patients detected ADRs using the CTCAE and Naranjo's tool. The independent variables include age, gender, kind of cancer, number of cycles, duration of stay, and comorbidities. This study ran for four months, from September to December 2019, at RSUD Dr. Moewardi Surakarta.

Adult cancer patients who utilize the carboplatin-paclitaxel regimen, have comprehensive data on the independent variable, and are willing to be the subject of research by providing informed consent. This research excludes people with HIV, TB, liver problems, renal disorders, and gastrointestinal illnesses. The data ADRs and severity of alopecia will be described as a percentage.

Result and Discussion

In October-December, 121 patients used the paclitaxel-carboplatin treatment regimen, and all of them were female. All of the patients were female since the carboplatin-paclitaxel treatment combination was utilized for chemotherapy in cervical, ovarian, and breast cancer at this institution. Women are more likely to get cancer, probably due to variations in hormones, including estrogen and progesterin, which are more prevalent in women. Furthermore, menopause increases the risk of cancer (Thapaliya *et al.*, 2014)^[11]. In this study, patients aged 46 to 65 had a greater proportion. This is consistent with previous studies, which found a clear association between increasing age and ADR levels (Schatz *et al.* 2015)^[10].

Table 1: Characteristics of patients using the paclitaxel-carboplatin regimen in cancer patients at Dr. Hospital. Moewardi Surakarta

Characteristics	Total (n = 121)	Percentage (%)
Gender		
Women	121	100
Man	0	0
Age		
16-25	1	0,8
26-35	2	1,6
36-45	19	15,7
46-55	43	35,5
56-65	43	35,5
>65	13	10,7
Ethnic		
Java	121	100
Cancer Type		
Ovarian Cancer	38	31,4
Cervical Cancer	44	36,3
Breast Cancer	39	32,2
Number of Cycle		
2	37	30,6
3	32	26,4

4	21	17,4
5	17	14,0
6	14	11,6
Length of Stay		
1 day	43	35,5
2 days	60	49,6
3 days	18	14,9
Comorbidity		
Without	98	81,0
With	23	19,0
Hypertension	4	3,3
Diabetes Mellitus	14	11,6
Hypertension+Diabetes Mellitus	4	3,3
Hypertension+Diabetes Mellitus+Ashtma	1	0,8

Patients using carboplatin-paclitaxel had a characteristic statistics of 31.4% ovarian cancer, 36.4% cervical cancer, and 32.2% breast cancer. The main treatment plan for adjuvant therapy of ovarian cancer in all stages is carboplatin-paclitaxel (Akin *et al.*, 2014)^[2]. The first line of treatment for advanced breast cancer is carboplatin-paclitaxel (Fountzilias *et al.*, 1998)^[5]. Treatment for cervical cancer is individualized based on the patient's state; recurrent and metastatic cervical cancer are treated with carboplatin-paclitaxel (NCCN, 2019)^[8]. Less toxicity than cisplatin and paclitaxel is one benefit of the combination of carboplatin and paclitaxel; however, it is important to monitor platelet counts, alopecia incidence, and neuropathy symptoms (Fotopoulou, 2014)^[4]. A different study found that the combination of carboplatin and paclitaxel was more successful than the combination of cisplatin and paclitaxel (Kolek, 2014)^[7].

Patients with breast, cervical, and ovarian cancers received a regimen of carboplatin-paclitaxel therapy every 21 days for six cycles. The largest percentage of patients in this study received chemotherapy in a second cycle. According to Kim *et al.* (2018)^[6], patients who have had more cycles are more likely to experience adverse drug reactions.

Table 2: Incident and Severity of Alopecia

ADRs	Incident (n = 121)	Grade 1 CTCAE	Grade 2 CTCAE	Grade 3 CTCAE
Alopecia	121 (100%)	0 (0%)	121 (100%)	0 (0%)

In this study patients with carboplatin-paclitaxel 100% had hair loss more than 50%. Hair loss more than 50% classified grade 2 by CTCAE. Chemotherapy generally acts by interfering with the more rapidly dividing cells of the body, including not only cancer cells but also hair follicles. Though chemotherapy is a common cause of hair loss, some chemotherapy agents routinely cause hair loss that is usually complete, while others far more rarely cause hair loss (West, 2017)^[12].

The incidence is estimated to be 65%, even if the prevalence and severity of hair loss are related to the drug category and to the number of administered drugs. With antimicrotubule agents, it is reported more than 80% incidence of alopecia, 60%-100% with topoisomerase inhibitors, >60% with alkylators, and 10%-50% with antimetabolites. Poly-chemotherapy is associated with higher incidences compared to monotherapy (Rossi *et al.*, 2017)^[9].

Alopecia happens on though the timing depends in part on the particular treatment, hair loss commonly occurs several

weeks after the start of treatment and may continue to progress gradually over 1 to 2 months. After chemotherapy is completed, hair commonly grows back, though occasionally with a different texture and/or color than a patient had previously. In a minority of patients, hair may not regrow (West, 2017)^[12].

In order to accelerate the regrowth after chemotherapy 2% topical minoxidil is the best treatment. Its mechanism of action is not already known, but several hypotheses have been proposed, such as the opening of potassium channels by its sulfated metabolite, stimulation of keratinocyte proliferation, inhibition of collagen synthesis and production, stimulation of vascular endothelial growth factor (VEGF) and prostaglandin synthesis. It was demonstrated that minoxidil prolongs the duration of anagen and enlarges miniaturized follicles. [19] It must be applied twice a day on the involved areas for at least 6 month. It has been demonstrated to reduce the severity and duration of alopecia. (Rossi *et al.*, 2017)^[9].

Conclusion

Chemotherapy Induced Alopecia due combination of carboplatin-paclitaxel was 100% with severity grade 2 (hair loss>50%).

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