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RESEARCH ARTICLE

Evaluation of drug utilization pattern of anticancer drugs in oncology department of a tertiary care teaching hospital of southern Rajasthan

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ABSTRACT

Background: Cancer becomes major health burden on society, increased mortality rate in developing and developed countries. Chemotherapy plays a key role in the management of cancer. Drug utilization studies give an idea about the prescribing practice and characterize the early signals of irrational drug use. **Aims and Objective:** The present study was designed to investigate the utilization pattern of anticancer drugs and incidence of cancer types at Oncology Department, Geetanjali Medical College and Hospital, Udaipur, Rajasthan. **Materials and Methods:** One ninety two prescriptions of cancer effected patients were screened for anticancer drugs and supportive medications from February 1, 2019, to September 30, 2019, according to disease type, respectively. **Results:** In our study, maximum cancer encountering age in both males and females was above 50 years, females are more predominant over males (female 53.64% vs. 46.35% males) with carcinoma of breast 15% followed by carcinoma of ovary 13% with carcinoma of lung 10% in males. Carboplatin 52.08% was the most commonly prescribed drug, followed by paclitaxel 45.31% and gemcitabine 33.85% along with adjuvants dexamethasone 100%, ranitidine 100%, and pantoprazole 35.93% successfully. **Conclusion:** Carboplatin with other anticancer drugs was a safer combination for treating above-mentioned carcinomas.

KEY WORDS: Anticancer Drug; Drug Utilization; Oncology; Carcinoma

INTRODUCTION

Drug utilization research was defined by the World Health Organization (WHO) in 1977 as the marketing distribution, prescription and use of drugs in a society, with special emphasis on the resulting medical, social, and economic consequences. In a particular setting, it gives an idea about the prescribing practice and characterizes the early signals of irrational drug use. With the help of WHO prescribing indicators, it is possible to analyze the drug utilization pattern in our setting.[1]

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Cancer is a major burden and threat to global society. It is one of the leading causes of death in both developed and developing countries.[2] It brings psychological and social distress to the patients and relatives and has become an important contributor to the global burden of disease.[3] Based on WHO survey reports, 8.2 million people succumbed from cancer in 2012, and it may rise to 19 million by 2025.[4] More than 0.6 million people die because of cancer each year, and approximately 42% of cancers are tobacco related[5] and 20% cancers due to hepatitis B, hepatitis C, and human papillomavirus infections.[6] Other 10% are due to obesity, poor diet, and lack of physical activity, which might be due to professional stress or lifestyle modifications, and excessive drinking of alcohol.[7]

In India, most frequent carcinomas are mouth/oropharynx, esophagus, stomach, and lungs/bronchus/trachea in males while carcinoma of cervix, breast, mouth/oropharynx, and esophagus in females.[8] Cancer is detected by certain signs and symptoms, medical imaging, biopsy, and other techniques.[9] Chemotherapy remains one of the integral components in the management of carcinomas. Chemotherapy was used alone or in combination with other modalities of management (radiotherapy and surgery). Chemotherapy alone or as a component of multimodality approach has been shown not only to be effective but also curative too in certain cases of squamous cell head and neck carcinoma, small cell and non-small cell lung carcinoma, breast carcinoma, cervix carcinoma, uterine carcinoma, and colorectal carcinoma.[10] Pain and symptomatic treatment are an important part of care. The probability of survival depends on the type of cancer and the extent of disease before the start of treatment.[11]

The utilization pattern of anticancer drugs has changed significantly in recent years because of better enhancement in pathophysiology of carcinomas as well as introduction of newer drugs. Significant variation in the response rate of individual anticancer drugs, availability of different regimens, and intolerability of combination regimens necessitate observation, and evaluation of cancer chemotherapy. Such information will help in optimizing antimalignancy therapy with improved efficacy and minimal toxicity. The drug utilization studies aim to evaluate factors such as prescribing, dispensing, administering, and taking of medication, and its associated events.[12]

MATERIALS AND METHODS

Aim and Objective

The present study was designed to investigate the utilization pattern of anticancer drugs and the incidence of cancer types at the Oncology Department, Geetanjali Medical College and Hospital, Udaipur, Rajasthan.

Study Design and Procedure

This study was a prospective observational study. After getting ethical clearance from the Institutional Ethical Committee (Ref: GU/HREC/EC/2019/684) study was started from February 1, 2019, to September 30, 2019. After taking concern letter, a total of 192 patients over 18 year's age were taken in the study whose cancer was objectively confirmed and joined for receiving anticancer therapy in daycare units, and wards were included in the study. The patients already went through surgery and radiotherapy also included in the study. The patients with end-stage cancer and patients only on radiotherapy and surgery, pregnant women, children <12 years age group were excluded from the study. The inpatient data sheets were carefully monitored for age, sex, and type of cancer, along with selective medication (chemotherapy and adjuvant therapy) prescribed with route and combination were taken into consideration.

Statistical Analysis

The results were expressed in percentage using Microsoft Excel, windows-7; version-2007 in tables and graphs along with WHO core prescribing indicators to know the type of drug therapy used (single/or multiple), injections prescribed, percentage of drugs prescribed from essential drugs list, and WHO list was noted, respectively.[13,14]

RESULTS

Out of 192 patients predominance of cancer in females 53.64% (n = 103), followed by males were around 46.35% (n = 89), summarized in Figure 1. The utmost cancer sufferers were in 51–60 years age and above 34.89%, moderate sufferers in 41–50 years age group 22.39%, and least sufferers in 21–30 years age group 2.60%, and only one patient was below 20 years age 0.52% summarized in Table 1. In our study, carcinoma of breast was most predominant 15% followed by carcinoma of ovary 13% and lung 10%, the percentage values of various types of cancer are illustrated in Figure 2.

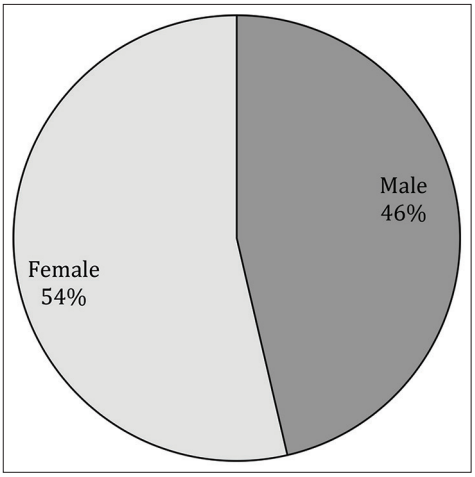

Figure 1: Gender predominance of cancer

Table 1: Age-wise cancer distribution

Age	No. of patients	%
<20	1	0.52
21–30	5	2.60
31–40	16	8.33
41–50	43	22.39
51–60	67	34.89
61–70	53	27.60
>71	7	3.64

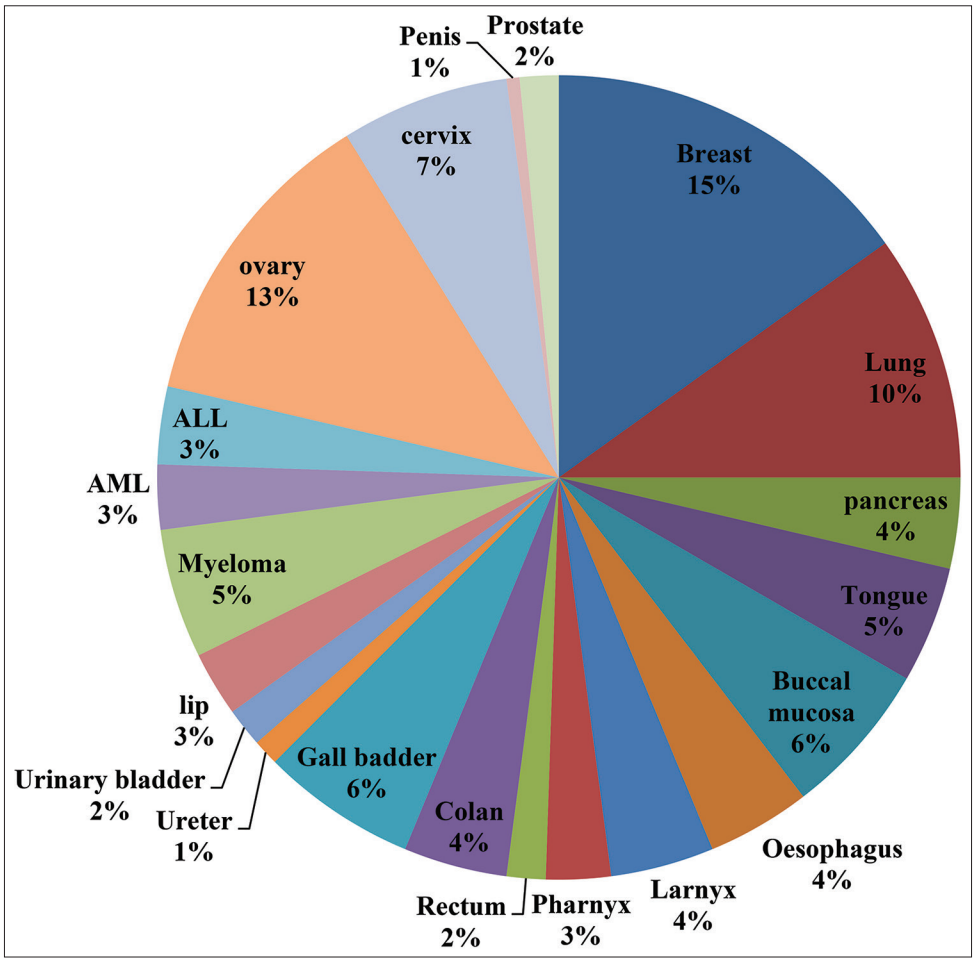

Figure 2: Predominance of various types of cancers and percentage (%)

Among the cancer patients, the majority of them were treated with double drug therapy 54.16% followed by mono 20.31% and triple 16.6% therapy, respectively. Paclitaxel and carboplatin combination was the highly prescribed combination 32.81% in double drug therapy and adriamycin; cyclophosphamide and vincristine combination was least preferred combination 0.52% in triple-drug therapy summarized in Table 2.

In our study, $n = 19$ cytotoxic drugs were prescribed from them platinum compounds (carboplatin 52.08%, cisplatin 13.54%, and oxaliplatin 1.04%) were most commonly prescribed followed by platinum compounds (paclitaxel 45.31%, and docetaxel 15.62%) and remaining cytotoxic drugs categorized according to their function are summarized in Table 3 and Figure 3. All the cytotoxic drugs were administered through intravenous route 100%.

As per, the WHO core prescribing indicators average number of drugs prescribed per prescription was 6.75. The percentage of drugs prescribed from National List of Essential Medicines (NLEM) and WHO list was 67.64, 58.82 summarized in the WHO prescribing indicators [Table 4].

During chemotherapy, most commonly prescribed adjuvant medicines were dexamethasone and ranitidine 100%, followed by ondansetron 62.5%, chlorpheniramine malate 45.31%, pantoprazole 35.93%, and magnesium sulfate 65.62%. Around 65.62% patients were on diuretics and analgesics like tramadol 28.12%. The cytoprotection drugs prescribed as filgrastim 23.95%, and leucovorin 14.06%, followed by zoledronic acid 33.33% prophylactically summarized in Table 5.

DISCUSSION

The drug utilization studies give an idea about the prescribing practice and characterize the early signals of irrational drug use and also provide powerful investigating contrivance to make data on the statistical validity of drugs in cancer treatment and policy-making by biasing the unwanted toxicities due to irrational drug use.

As per gathered information from the oncology department, the incidence of carcinoma was high in females than males (103 females vs. 89 males) and female to male ratio was around 1.15% high in this study, Kirthi *et al*. reported the same about female predominance of cancer in her study.[15] The age-related metabolic changes and status of living also impose cancer predominance.[16] This statement in consistent

with our study, around 66.14% cancer patients were above the age of 50 years.

In our study, carcinoma of breast was most predominant 15%, followed by carcinoma of ovary 13%, carcinoma of cervix 7%, and gallbladder cancer 6% in females. This statement is consistently matching with a survey conducted in various Indian states reported majority of females prevail breast and urogenital cancers[17,18] along with gallbladder cancer, which is related to female sex hormones and their receptors.[19] In males, lung cancer 10% is majorly predominating with other cancers of head and neck in same sex representing in our study. This description is consistently matching with Gupta *et al.* explained predominance of said cancers in males due to unhealthy dietary habits by India level survey.[19] The paclitaxel and carboplatin combination was the most commonly prescribed double drug combination regimen in our study 32.81% and carboplatin was the most commonly prescribed drug followed by paclitaxel and gemcitabine. Preferring carboplatin with other anticancer drugs is due to its low neurotoxic profile than cisplatin,[20] and also carboplatin protects nerves from paclitaxel-induced neuropathy,[21] and work with great efficacy and safety in treatment of metastatic breast cancer.[22] The same combination regimen was preferred by Pentareddy *et al*. in his prescription based study for treating carcinoma of breast, urogenital carcinoma.[3] The gemcitabine and carboplatin are the best synergistic drugs for treating biliary tract/gallbladder carcinoma in females due to low genotoxic profile.[23,24] Here, in our study, this combination is preferred to treat biliary tract carcinoma in 6.25% patients. The same carboplatin was successfully used in the treatment of lung cancer in males with pemetrexed due to its high safety margin and less hematological toxicity followed by carboplatin and paclitaxel combination in head and neck cancers. The same combination was followed by Pentareddy *et al.*[3] for treating lung 66.66%, head and neck cancers consistently matching with our study.

As we know, most of the anticancer drugs had their own generating side effects such as nausea and vomiting, were most commonly treated with dexamethasone and ranitidine in all the patients 100% followed by pantoprazole 35.93%, metoclopramide 38.54% consistently matching with Mathew *et al*.,[25] along with analgesics like tramadol 28.12% in some patients who reported the same in his study. Furosemide and mannitol were coprescribed with cisplatin and carboplatin

Table 2: Type of cytotoxic drug therapy prescribed in patients

Type of drug therapy	Number of patients prescribed
Double therapy	110
Monotherapy	39
Triple therapy	32
Paclitaxel and carboplatin (Two drugs)	63
Rituximab, adriamycin, and vincristine (Three drugs)	1

Table 3: Functional classification of cytotoxic drugs

Functional classification	Cytotoxic drugs	Number of prescriptions (%)
Platinum compounds	Carboplatin	52.08
	Cisplatin	13.54
	Oxaliplatin	1.04
Taxanes	Paclitaxel and nab. Paclitaxel	45.31
	Docetaxel	15.62
Antimetabolites	Gemcitabine	33.85
	5 FU	14.06
	Pemetrexed	5.20
Antibiotics	Adriamycin	5.20
	Doxorubicin	3.12
Topoisomerase inhibitors	Irinotecan	2.60
	Etoposide	3.12
Vinkaalkaloids	Vincristine	5.20
	Vinblastine	0.52
Proteasome inhibitors	Bortezomib	5.20
Alkylating agents	Cyclophosphamide	2.60
Monoclonal antibodies	Trastuzumab	2.08
	Rituximab	0.52
Others	Azacitidine	2.60

Table 4: WHO prescribing indicators

Prescribing indicators	In patient (%)
Average number of cytotoxic drugs prescribed per prescription	1.94
Average number of cytotoxic injections prescribed per prescription	100
Average number of drugs prescribed per prescription	6.75
Percentage of drugs prescribed from NLEM	65.62
Percentage of drugs prescribed from WHO list	56.25

Table 5: Adjuvant drugs prescribed

Adjutant drugs	Number of patients prescribed	%
Dexamethasone	192	100
Ranitidine	192	100
$MgSO_4$ and diuretics	126	65.62
Ondansetron	120	62.5
Chlorpheniramine	87	45.31
Metoclopramide	74	38.54
Pantoprazole	69	35.93
Zolendronic acid	64	33.33
Tramadol	54	28.12
filgrastim	46	23.95
Leucovorin	27	14.06

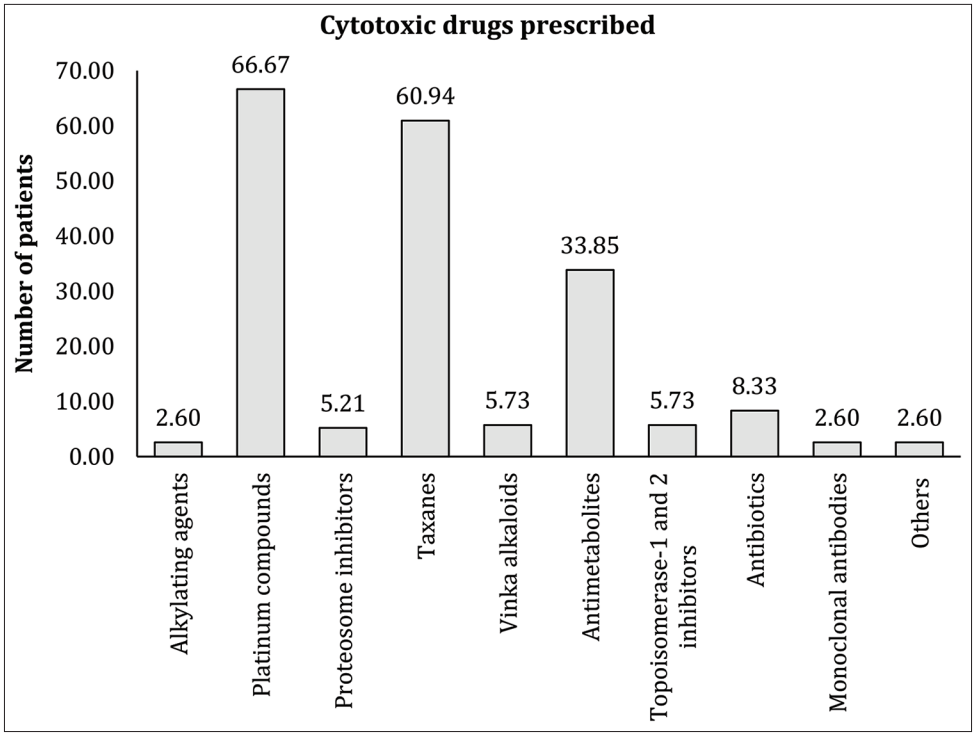

Figure 3: Cytotoxic drugs used in cancer treatment

to induce force diuresis,[26] followed by zoledronic acid to replenish the calcium stores[27] and filgrastim to avoid neutropenia.[28] The unnecessary use of antibiotics in this study was not observed for generating side effects such as skin blistering, and fungal infections during the study.

The prescribing indicator shows the average number of drugs prescribed from the WHO list of medicine and NLEM was 56.25% and 65.62%, respectively, in contrary to Mathew *et al*.,[25] where the values around 78.92% and 80.84% because prescription pattern differs from clinician to clinician-patient to patient and disease status in that area. Hence, this could be a reason for percentage difference between two studies. All the cytotoxic drugs were prescribed in injection form with 100% value matching with Mathew *et al*.[25] with same percentage. The average number of drugs prescribed per prescription in our study was 6.75%, and adjuvants/supportive medicines prescribed 3.2% consistently matching with Bepari *et al.*,[5] where he prescribed 6.01% of drugs per prescription with 4.73 adjuvant medicines.

CONCLUSION

The most predominant form of carcinoma observed in our study was female breast and genital organ carcinoma along with lung, head and neck carcinoma in males. This shows the female predominance of cancer over males in our study. The carboplatin was the most commonly prescribed drug with other cytotoxic drugs such as paclitaxel and gemcitabine in the treatment of breast and genital cancers in females followed by lung and head and neck cancers in males with pemetrexed, respectively. The most commonly used adjuvant medicines in our study were dexamethasone, ranitidine, pantoprazole for avoiding chemotherapy-induced nausea, vomiting, and peptic ulcers.

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