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Research Article

DRUG UTILIZATION PATTERN IN INDOOR PATIENT OF RADIOTHERAPY DEPARTMENT AT A TERTIARY CARE HOSPITAL IN SOUTHERN RAJASTHAN

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ABSTRACT

Objective: The study was planned to evaluate on drug utilization pattern of drug use in the indoor of radiotherapy department, using the World Health Organization recommended core drug use indicators, to compare the cost of drug used and to provide feedback to the concerned department to improve rational prescribing.

Methods: Four hundred and five newly diagnosed cases of cancer with age more than 18 of both genders were included in the study. The demographic data, diagnosis, group of anticancer drugs, individual anticancer drug, combinations of anticancer drugs, and cost of drug reactions were recorded and analyzed statistically, using descriptive study statistics.

Results: Cervical cancer (19.51%) was the most frequently diagnosed cancer, followed by lung cancer (17.04%). Platinum compounds (76.30%) were maximum utilized group of drugs. Carboplatin was the most commonly prescribed drug (53.09). Average number of drugs prescribed per prescription was 8.77. Carboplatin + Paclitaxel combination was the most commonly prescribed combination. Pantoprazole was maximally used adjuvant drug.

Conclusion: 100% of drugs were prescribed by generic name and 86.27% of drugs were prescribed from National List of Essential Medicines of India, 2022 indicates rational prescribing. The cost of anticancer drugs was much less in comparison to other studies.

Keywords: Drug utilization, Anticancer drugs, Prescribing pattern.

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INTRODUCTION

Cancer is a leading cause of death worldwide, accounting for nearly 10 million deaths in 2020, or nearly one in six deaths [1]. It is the second leading cause of death in developing countries. In India also, among all non-communicable diseases, cancer is the biggest cause of mortality, where every year approximately 0.6 million people die of cancer, and 1.1 million new cancer cases are diagnosed per year. Anticipated incidence of cancer amongst males is 679421 and that in females is 712758 for the year 2020 according to cancer statistics [2]. Treatment provided to cancer patient may by chemotherapy, immunotherapy, hormones, or radiation therapy. Some cases need surgical intervention [3]. Anticancer drugs kill rapidly multiplying cells. They are prescribed as a single drug or in combination, depending on type and stage of cancer [4]. The world's population is both aging and growing, while cancer-inducing behaviors, particularly smoking, are becoming more common in developing nations like India. Together, these factors contribute significantly to the increasing global burden of cancer [5,6]. The therapy provided for the treatment of cancer is relatively costly, along with it; anticancer drugs produce so many adverse drug reactions. Cytotoxic drugs suppress the immune system of the patient and there are chances of developing infections. Antibiotics are also used for the treatment and prevention of these infections. All such factors further increase the cost of therapy [7].

According to the World Health Organization (WHO), "Drug utilization has been defined as the marketing, distribution, prescription, and use of drugs in a society with special emphasis on the resulting medical and social consequences." Drug utilization research is conducted to evaluate the pattern of drug prescribing according to the factors provided by the WHO to promote rational therapy and to reduce the cost of treatment [8]. Due to the progressive increase in the number of cancer patients, higher cost, and low safety of the therapy, such research is crucial for developing countries like India to promote rational therapy, so the study was planned to evaluate prescribing pattern of anticancer drugs in radiotherapy department at a tertiary care teaching hospital in southern Rajasthan.

METHODS

This descriptive cross-sectional study was conducted in the radiotherapy department of a tertiary care teaching hospital, 405 cancer patients were included in the study, using convenient sampling method. After taking permission from Institutional Ethics Committee, the study was conducted in the period of 9 months.

Inclusion criteria

All patients (both male and female) of the age group 18 years and above with confirmed diagnosis, admitted to indoor of radiotherapy were included in the study.

Exclusion criteria

Patients, not willing to be part of study.

Collection of data

A standard subject data collection form was prepared including information about sociodemographic data, diagnosis, details of treatment prescribed, cost of treatment, and adverse drug reaction occurred.

Statistical analysis

This present study data were collected and entered in the Microsoft Excel sheet and analyzed, using descriptive statistics.

RESULTS

In the study, out of 405 patients, 179 (44.20%) were male and 226 (55.80%) were female. The prevalence was higher in females as compared to males. According to the modified Kuppuswamy Socioeconomic Scale 2022, 209 (51.60%) were from the upper lower class, 115 (28.40%) were from the lower class, 73 (18.02%) were from a lower middle class, 8 (1.98%) were from the upper middle class and no patient was found from upper class [9].

Regarding diagnosis, cervical cancer was the most frequently diagnosed cancer, accounting for 19.51% of cases, followed by lung cancer at 17.04%. Diffuse large B-cell lymphoma was the least commonly diagnosed cancer, representing only 0.74% of cases (Table 1).

In this study, maximum prescribed class of drug was Platinum compound (76.30%), followed by microtubule damaging drugs (60%), antimetabolites (30.12%), alkylating agents (11.60%), antitumor antibiotics (10.12%), topoisomerase inhibitors (6.17%), epidermal growth factor receptor inhibitors to (6.17%), angiogenesis inhibitors (3.46%), glucocorticoids (3.21%), CD20 inhibitors (2.72%), and tyrosine kinase inhibitors (1.48%).

Regarding prescribing pattern of individual anticancer drugs, the maximum prescribed drug was Carboplatin, and Lenvatinib was prescribed the least (Fig. 1).

The anticancer drugs were prescribed in various combinations. Two drug combinations were maximally used while five drug combinations were used the least (Table 2). The average number of anticancer drugs per encounter was 2.11, while the average total number of drugs, including adjuvant drugs, per encounter, was 8.77. 100% of drugs were prescribed by generic names while 86.27% of drugs were prescribed from the National List of Essential Medicines (NLEM) of India, 2022 [10].

Considering routes of drug administration, 100% of patients received intravenous drugs, 19.26% received oral drugs, 18.27% by subcutaneous route, and 12.84% patients received drugs by intramuscular route. Carboplatin contributed to the major cost in drug

Table 1: Distribution of patients based on diagnosis

S. No.	Diagnosis	No. of patients	Percentage
1	Cervix cancer	79	19.51
2	Lung cancer	69	17.04
3	Breast cancer	53	13.09
4	Ovary cancer	30	7.41
5	Tongue cancer	22	5.43
6	Head-and-neck cancer	20	4.94
7	Esophagus cancer	17	4.20
8	Buccal mucosa cancer	16	3.95
9	Non-Hodgkin lymphoma	11	2.72
10	Colon cancer	10	2.47
11	Gall bladder cancer	10	2.47
12	Stomach cancer	10	2.47
13	prostate cancer	8	1.98
14	Renal cell cancer	7	1.73
15	Pancreas cancer	5	1.23
16	Oropharynx cancer	5	1.23
17	Ewing sarcoma	5	1.23
18	Urinary bladder cancer	5	1.23
19	Testis cancer	4	0.99
20	Rectum cancer	4	0.99
21	Nasopharynx cancer	4	0.99
22	Endometrial cancer	4	0.99
23	Malignant pleural mesothelioma	4	0.99
24	Diffuse large B-cell lymphoma	3	0.74
	Total	405	100.00

Table 2: Total number of anticancer drugs prescribed per encounter (n=405)

	Drugs	No. of patients	Percentage
Single drug		29	7.16
1	Cisplatin	13	3.21
2	Trastuzumab	8	1.98
3	Docetaxel	4	0.99
4	Carboplatin	1	0.25
5	Gemcitabine	1	0.25
6	Pemetrexed	1	0.25
7	Bevacizumab	1	0.25
Two drug combination		321	79.26
1	Carboplatin +paclitaxel	157	38.77
2	Carboplatin +pemetrexed	21	5.19
3	Cyclophosphamide +doxorubicin	20	4.94
4	Oxaliplatin +capecitabine	18	4.44
5	Carboplatin +gemcitabine	16	3.95
6	Cisplatin +gemcitabine	16	3.95
7	Gemcitabine +docetaxel	10	2.47
8	Cisplatin +etoposide	7	1.73
9	Cyclophosphamide +docetaxel	6	1.48
10	Oxaliplatin +5-fluorouracil	5	1.23
11	Docetaxel +prednisolone	5	1.23
12	Cabozantinib +bevacizumab	5	1.23
13	Carboplatin +etoposide	4	0.99
14	Cisplatin +pemetrexed	4	0.99
15	Cisplatin +docetaxel	4	0.99
16	5-fluorouracil +irinotecan	4	0.99
17	Cisplatin +5-fluorouracil	3	0.74
18	Capecitabine +irinotecan	3	0.74
19	Paclitaxel +trastuzumab	3	0.74
20	Ifosfamide +etoposide	2	0.49
21	Cisplatin +paclitaxel	2	0.49
22	Carboplatin +irinotecan	1	0.25
23	Carboplatin +doxorubicin	1	0.25
24	Capecitabine +trastuzumab	1	0.25
25	Paclitaxel +gefitinib	1	0.25
26	Lenvatinib +bevacizumab	1	0.25
27	Gefitinib +bevacizumab	1	0.25
Three drugs combination		42	10.37
1	Oxaliplatin +capecitabine +docetaxel	6	1.48
2	Cyclophosphamide +vincristine +doxorubicin	5	1.23
3	Carboplatin +paclitaxel +bevacizumab	5	1.23
4	Cisplatin +5-fluorouracil +docetaxel	5	1.23
5	Carboplatin +paclitaxel +5-fluorouracil	4	0.99
6	Carboplatin +paclitaxel +trastuzumab	4	0.99
7	Cisplatin +paclitaxel +gefitinib	4	0.99
8	Cisplatin +etoposide +bleomycin	3	0.74
9	Cyclophosphamide +docetaxel +trastuzumab	2	0.49
10	Cisplatin +paclitaxel +ifosfamide	1	0.25
11	Carboplatin +docetaxel +trastuzumab	1	0.25
12	Cisplatin +docetaxel +capecitabine	1	0.25
13	Cisplatin +docetaxel +bevacizumab	1	0.25
Four drug combination		5	1.23
1	Ifosfamide +vincristine + doxorubicin +rituximab	3	0.74
2	Oxaliplatin +methotrexate + vinblastine +doxorubicin	2	0.49

(Contd...)

Table 2: ***(Continued)***

	Drugs	No. of patients	Percentage
Five drug combination		8	1.98
1	Cyclophosphamide +doxorubicin +vincristine +rituximab +prednisolone	8	1.98

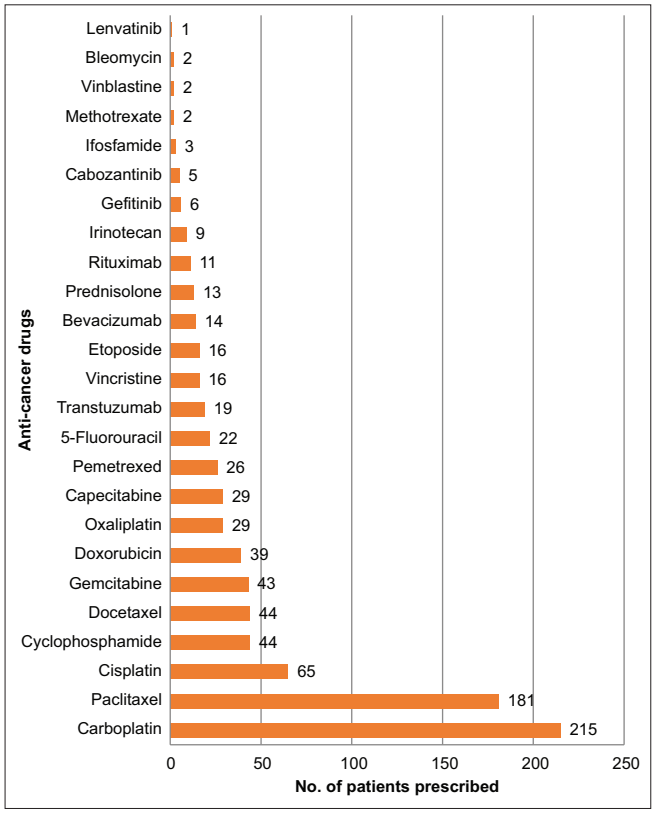

Fig. 1: Prescription pattern of each anticancer drug

therapy while methotrexate was the least expensive drug. Cost of Aati-cancer drugs per prescription was 4959.81 INR.

DISCUSSION

In the present study, female participants were 56% in comparison to male (44%). Similar result was observed in a study conducted by Aggarwal *et al*. [11] and Mandal *et al*. [12].

Regarding diagnosis of the cases, in the study conducted by Aggarwal *et al*. The most common diagnosis was carcinoma cervix, which was similar to our study but the remaining distribution was different while in the study conducted by Mandal *et al*., the most common diagnosis was carcinoma breast. As all studies are conducted at different places and different time and in different types of institutions, studies including the large number of participants are needed to analyze the diagnosis pattern in different populations.

In the present study, maximum prescribed class of drug was Platinum compound (76.30%), followed by microtubule-damaging drugs (60%) and a least prescribed group of drug was tyrosine kinase inhibitors (1.48%). Nearly similar results were observed in studies conducted by Mandal *et al*. and Kamlekar *et al*. [13].

In our study, average number of anticancer drugs prescribed per encounter was 2.11 while the average number of associated drugs prescribed per encounter was 6.66. The total number of drugs prescribed per encounter in the study was 8.77, which was 9.1 in the study conducted by Aggarwal *et al*., and 7.7 in the study conducted by Chandan *et al*. [14] In study conducted by Mandal et al, average number of anticancer drugs prescribed per encounter was 2.82 and total number of drugs prescribed per encounter was 4.86. The associated drugs prescribed in their study was less. Number of anticancer drugs prescribed per prescription depends upon the type and stage of cancer, which was not considered in all studies.

In our study, the maximum prescribed drug was Carboplatin (53.09%), followed by paclitaxel (44.69%) and Lenvatinib (5.43%) was the minimum prescribed drug (Fig. 1). In a study conducted by Aggarwal *et al*., Mugada *et al*. [15], and Mandal *et al*., cisplatin was the maximally utilized drug but in the study by Bepari *et al*., [16] paclitaxel was maximally utilized.

Two drugs combination was the most prescribed combination in the present study (Table 2), similar results were observed in studies conducted by Mandal *et al*. and Kamlekar *et al*. while in study conducted by Bepari *et al*., a single drug was prescribed to most of the patients.

In the present study, intravenous fluids, pantoprazole, ondansetron, and dexamethasone were prescribed to all patients (100%). Followed by tramadol (30.37%), metoclopramide (25.43%), potassium chloride (17.28%), magnesium sulfate (15.80%), mannitol (14.57%), ferric carboxymaltose (14.32%) ceftriaxone (13.83%), erythropoietin (12.59%), paracetamol (11.85%), furosemide (11.60%), tranexamic acid (11.11%), ciprofloxacin (10.12%), amikacin (8.40%), zoledronic acid (8.15%), Vitamin b12 (7.90%), Mesna (7.90%), metronidazole (7.65%), piperacillin-tazobactam (7.41%), amoxiclav (7.16%), leucovorin (5.93%), folic acid (5.93%), filgrastim (5.68%), and dicyclomine (4.94%). In other studies, conducted by Aggarwal *et al*., Mandal *et al*., and Bepari *et al*., the maximally prescribed adjuvant drug was antiemetics. Utilization of adjuvant drugs depends on the diagnosis, demographic characteristics of the patient, associated ailments, prevention and treatment of ADRs, prevention of infection, and nutritional supplements. Further expanded studies are needed to analyze it.

In the present study, 86.27% of drugs were prescribed from the NLEM. Similar results were observed in study conducted by Aggarwal *et al*., Mandal *et al*., and Bepari *et al*. In our study, 100% of drugs were prescribed by generic names which was not found in any of the study. Prescribing with a generic name reduces the cost of the treatment. In developing countries like India cost is one of the major factors which affect the pattern of drug utilization. The drugs were prescribed free of cost to all the patients from government supply. In the present study, cost of anticancer drugs per prescription was 4959.81 INR. In a study conducted by Kumar *et al*., [17] it was 11135 INR, in the study conducted by Dutta *et al*., [18] it was Rs.14186.68. The cost in other studies was more than 2–3 times of our study.

In the present study, the drugs were prescribed rationally by generic names. Most of the drugs were prescribed from the NELD (year 2022). The list of drugs available in the hospital and the national essential list of drugs were available in the indoor, the cost of therapy was very less in comparison to other studies, and the drugs were provided free of cost to the patient, which were the encouraging points in the study while the study was conducted for limited time period included limited number of patients and all types of carcinomas, Drug utilization for individual type of carcinoma could not be done and follow-up was not done, so the outcome could not be correlated with the drug utilized were some limitations in the study.

The study can be further expanded in the future by evaluation of drug utilization pattern of individual carcinoma. The stage of carcinoma at the time of initiating the therapy may also be included to correlate the outcome with the severity of the carcinomas. In the government setup, the drugs were prescribed by generic name. A multicenter study can

be planned to compare the utilization pattern, adverse drug reactions, outcome, and cost of therapy in government versus private setups. The feedback of such research would be very useful in improving the rational prescribing in cancer therapy.

CONCLUSION

This study provides the baseline data regarding the prescribing pattern in cancer patients and overall prescribing pattern of anticancer drugs was rational as per guidelines. Cervical cancer was the most prevalent cancer and carboplatin was the most commonly used cytotoxic drug followed by Paclitaxel, and Cisplatin in the study. 86.27% of drugs were prescribed from the national essential drug list, 100% of drugs were prescribed by the generic name and most of the drugs were provided free of cost to the patient. The adverse drug reactions were well managed.

SOURCE OF SUPPORTS

Nil.

CONFLICTS OF INTEREST

None.

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