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Original Research Article

Assessing anticancer drug utilization patterns through WHO prescribing indicators at a specialized cancer hospital in Peshawar

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ABSTRACT

Background: Efficient utilization of anticancer agents is crucial for effective malignancy treatment and cost management. WHO Prescribing Indicators provide a standardized measure for assessing drug usage. This study aimed to evaluate anticancer drug utilization patterns in a specialized oncology hospital using these indicators.
Methods: A cross-sectional analysis involved reviewing medical records of anticancer drug prescriptions at a designated cancer treatment facility. Key WHO prescribing indicators, including drug per prescription average, proportions of anticancer drugs and generics usage, were assessed.
Results: Analysis of 900 prescriptions revealed an average of 8.36 drugs per prescription, with 2.27 being anticancer drugs and 4.93 adjuvants. Notably, 71% of medications were prescribed generically 85% were on the Essential Medicines List. Opportunities for enhancing efficiency, like promoting generic drugs and reducing injectable anticancer agents, were identified.
Conclusions: This study highlights the value of WHO Prescribing Indicators in analysing anticancer drug utilization trends. Addressing prescribing deficiencies can refine treatment protocols, promote judicious pharmaceutical use and elevate patient care standards. Future efforts should focus on targeted strategies to rectify these shortcomings, emphasizing ongoing research and quality improvement in oncologic pharmacotherapy.

Keywords: Anticancer drugs, Drug utilization pattern, WHO prescribing indicators

INTRODUCTION

Cancer represents a formidable challenge and a significant public health threat worldwide, ranking as a leading cause of morbidity and mortality across both developed and developing nations.[1] The World Health Organization (WHO) identifies cancer as the second leading cause of death globally, highlighting its pervasive impact on society.[2] Defined as a group of diseases characterized by uncontrolled cell growth and the potential for metastasis, cancer encompasses a variety of conditions that can affect any part of the body.[3] The concept of Drug Utilization Studies (DUS) was introduced by the WHO in 1977, focusing on the marketing, distribution, prescription and consumption of drugs within a society and examining the medical, social and economic outcomes that ensue. Such studies are pivotal for identifying early indicators of irrational drug use and for understanding prescribing

practices within specific contexts, aided by WHO prescribing indicators. Recent data from the WHO reveals that cancer was responsible for 8.2 million deaths in 2012, with projections suggesting a rise to 19 million by 2025.[4] Annually, cancer claims over 600,000 lives, with risk factors such as tobacco use, viral infections (hepatitis B, C and human papillomavirus), obesity, poor diet, lack of physical activity and excessive alcohol consumption contributing significantly to its prevalence. These risk factors are often exacerbated by lifestyle changes, including work-related stress. DUS plays a crucial role in tracking drug exposure trends and informing national health policies aimed at promoting the use of safe and effective medications.[5,6] In 2018, cancer accounted for 9.6 million deaths globally, representing one-sixth of all deaths, with the rising incidence attributed to factors like aging populations, obesity, smoking and dietary habits.[7] Despite advances in treatment that have extended lives, such therapies often come with the burden of comorbidities and metastatic disease.[8,9]

Prescribing patterns serve as a vital tool for assessing the societal impact of medications and are instrumental in health care budgeting. These patterns offer a methodological approach to analysing drug prescription and utilization.[10] In the realm of oncology, chemotherapy remains a cornerstone of treatment for various carcinomas, employed both as a standalone therapy and in combination with radiation and surgery. Its efficacy in treating a range of cancers, including those of the head, neck, lung, breast, cervix, uterus and colorectum, underscores its importance in cancer management.[11]

Moreover, controlling pain and other symptoms is crucial, with patient survival often depending on the cancer type and stage at diagnosis.[12] While anticancer treatments have significantly improved patient outcomes, their potential adverse effects necessitate judicious use, emphasizing the importance of rational drug use, which includes procuring medications at the lowest possible cost and adhering to recommended dosing guidelines.[13]

Current treatment modalities for cancer, such as immunotherapy, chemotherapy, radiation therapy and surgery, reflect the complex nature of cancer management. The administration of cancer chemotherapy, whether through single agents or combinations of anti-neoplastic drugs has evolved significantly, driven by the advent of new medications and a deeper understanding of cancer pathophysiology.[14-17] This evolution in prescription patterns for anticancer medications highlights the dynamic landscape of cancer treatment and the ongoing need for research to optimize therapeutic strategies.

The primary aim of this investigation is to systematically analyse the patterns of anticancer medication utilization and to examine the incidence rates of different types of cancer at the specialized cancer hospital in Peshawar with following objectives.

Quantify and categorize the types of anticancer medications prescribed to patients, with a focus on understanding the frequency and diversity of these drugs in a clinical setting. Assess the incidence and distribution of various cancer types among the patient population, emphasizing gender, age and geographical variations to identify any significant trends or patterns. Evaluate the alignment of prescribed anticancer medications with established guidelines and recommendations, specifically analysing the extent to which these prescriptions adhere to the world health organization's essential medicines list and other recognized treatment protocols. Contribute to the optimization of cancer treatment protocols by providing data-driven insights into current prescribing practices, with the ultimate objective of enhancing patient outcomes and minimizing the adverse effects associated with anticancer therapies.

METHODS

Study design and procedure

A cross-sectional study was conducted in which 900 prescriptions of patients were selected in time period (Jan 2023 to Dec 2023) having difference in gender, age, address, diagnosis and treatment whose cancer was objectively confirmed and joined for receiving anticancer therapy in day care units and wards. The patients having pregnancy, supportive treatment and only radiotherapy were excluded from our study. The patient data sheets were carefully analysed for age, sex and type of cancer along with selective medication prescribed with route and drug nature considerations.

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, injections prescribed, percentage of drugs prescribed from essential drugs list and WHO list was noted, respectively.

RESULTS

Out of 900 patients, male constituted 41% (n=370) and female constituted 59% (n=570) of the total study population as summarized in Figure 1. The majority of patients having frequency of 224 (24.8%) were in the age group of 51-60 years followed by n=182 (20.2%) in 61-70 years, n=174 (24.8%) in 41-50 years, n=144 (12.6%) in 31-40, n=88 (9.8%) in 71-80, n=55 (6.1%) in 21-30 years, n=30 (3.3%) in 10-20 years, n=19 (2.1%) in>80 years and n=14 (1.5%) were included in age group<10 years as illustrated in figure 2.

The utmost cancer suffer were in Peshawar (210 Patient) followed by Agencies (138 patients), Mardan (125 patients), Kohat (92 patients), Swabi (76 patients), Nowshera (64 patients), Swat (36 patients), Karak (16

patients), Waziristan (13), Lakki Marwat (12 patients), Abbottabad (3 patients) and less severe in Attack which is only 2 patients as shown in the Figure 3. In our study carcinoma was the most predominant among lymphoma, myeloma, sarcoma and others. The percentage of carcinoma were 80.88% followed by sarcoma (7%), lymphoma (6.33%) and others (3.22%). The less severe were myeloma which were just 2.55%. The percentage of types-wise cancer distribution are illustrated in Figure 4. The cancer was divided into four major category such as lymphoma, Sarcoma, carcinoma, Myeloma and others. The different types of cancer along with frequencies and percentage are summarized in Table 1.

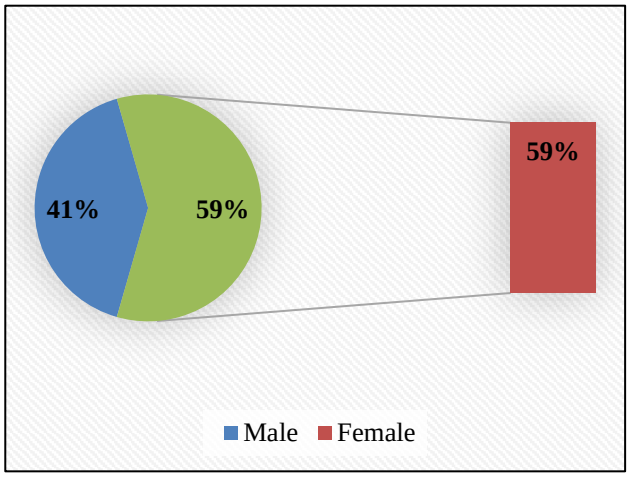

Figure 1: Gender predominance of cancer.

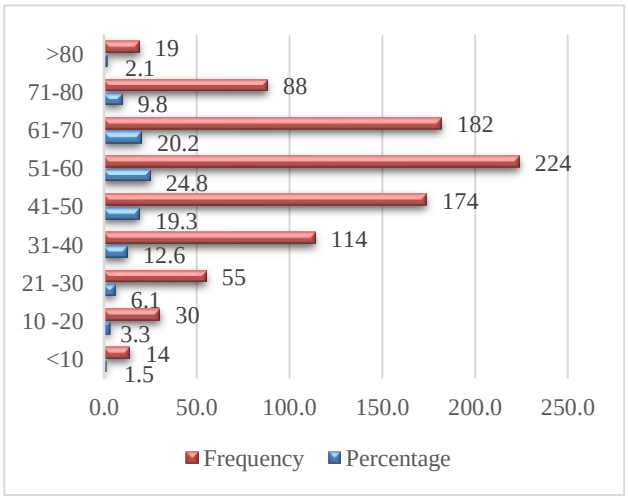

Figure 2: Age-wise cancer distribution.

The total number of drugs prescribed to 900 patients were 7530. Among them, 6493 were injectables, 4444 were pre-chemotherapy drugs while the frequencies of oral drugs administered were 1037 and cytotoxic drugs were 2049. The different classes of drugs along with frequencies are shown in the Table 2. The values of WHO prescribing indicators from our study were shown in Figure 5. The values of WHO indicators were compared with other studies as shown in Table 3.

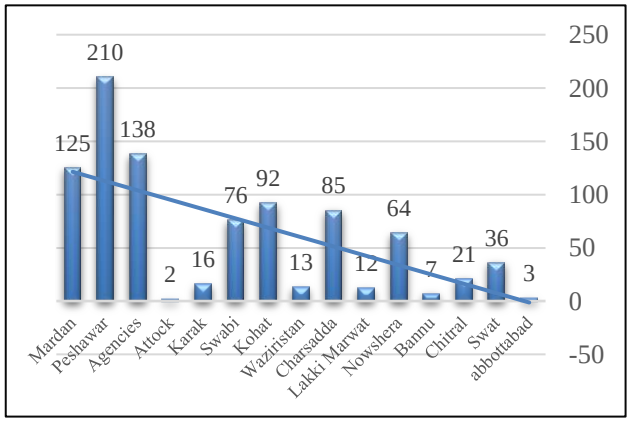

Figure 3: Address-wise cancer distribution.

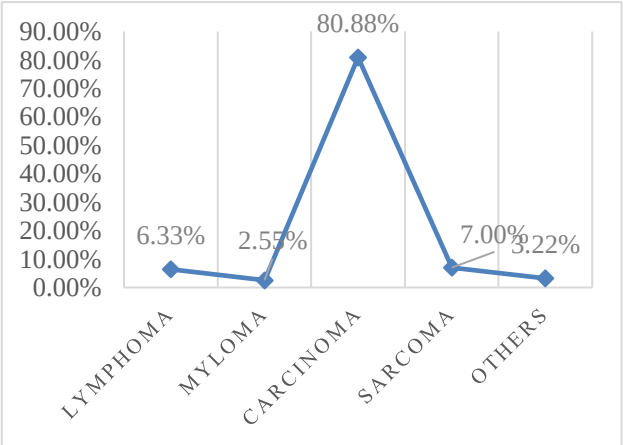

Figure 4: Types-wise cancer distribution.

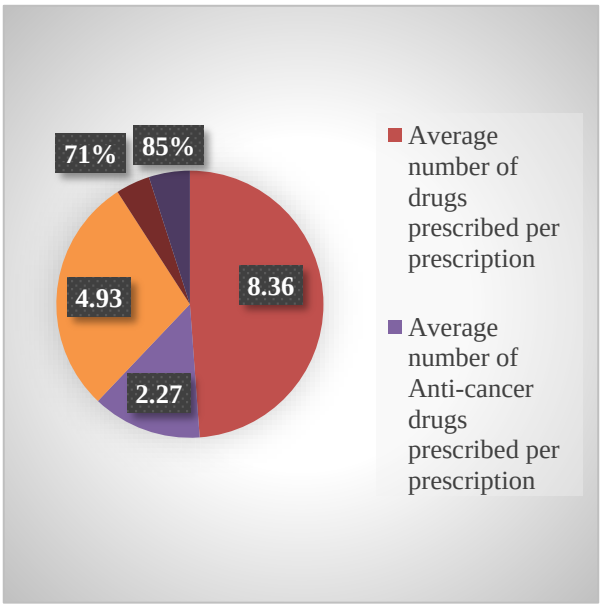

Figure 5: WHO prescribing indicators.

Table 1: Categories of cancer.

Category	Type	Frequency(n)	%
Lymphoma	Non-Hodgkin's lymphoma	17	1.88
	Hodgkins's lymphoma	16	1.77
	Diffuse large B-Cell lymphoma	14	1.55
	Follicular lymphoma	4	0.44
	T cell lymphoma	4	0.44
	Anaplastic lymphoma	2	0.22
Sarcoma	Ewing sarcoma	23	2.55
	Synovial sarcoma	14	1.55
	Osteosarcoma	6	0.66
	Rhabdomyosarcoma	5	0.55
	Soft tissue sarcoma	3	0.33
	Liposarcoma	3	0.33
	Spindle cell sarcoma	3	0.33
	Chondro sarcoma	2	0.22
	Cutaneous leucosarcoma	1	0.11
	Round Blue cells sarcoma	1	0.11
	Leiomyosarcoma	1	0.11
	Fibrosarcoma	1	0.11
Carcinoma	Ca Breast	282	31.33
	Ca Genital	147	16.33
	SCC (skin cancer)	43	4.77
	Ca Lung	42	4.66
	Ca stomach	38	4.22
	Ca oral cavity	33	3.66
	Ca colon	28	3.11
	Ca oesophagus	24	2.66
	Ca face	24	2.66
	Ca gall bladder	18	2.00
	Ca pancreas	18	2.00
	Ca neuroendocrine	10	1.11
	Ca liver	6	0.66
	Ca maxilla	4	0.44
	Ca kidney	4	0.44
	Ca sacral	2	0.22
	Ca eye	3	0.33
	Ca thyroid	2	0.22
Myeloma	Multiple myeloma	14	1.55
	Solitary myeloma	6	0.66
Others	malignant myeloma	3	0.33
	Malignancy of undefined primary origin (muo)	3	0.33
	Brain tumour	15	1.66
	Fibromatosis	4	0.44
	Leukaemia	7	0.77

Table 2: The Frequencies along with drug, class and dosage forms.

Dosage forms	Class of drugs	Drugs	Frequency
	Platinum compounds	Carboplatin	134
		Cisplatin	105
		Oxaliplatin	113
	Taxanes	Paclitaxel	113
		Docetaxel	84
	Antimetabolites	5fu	139

Continued.

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Dosage forms	Class of drugs	Drugs	Frequency
		Gemcitabine	134
		Pemetrexed	16
Injectables		Methotrexate	24
		Cytrabine	3
	Topoisomerase inhibitors	Etoposide	16
		Topotecan	16
		Ironotecan	4
	Proteasome inhibitors	Bortizumab	10
	Alkylating agents	Ifosphamide	35
		Cyclophosphamide	136
		Decarbazine	5
		Bendamustin	9
	Monoclonal antibody	Transtuzumab	72
		Rituximab	21
		Bevacizumab	5
		Nivulimab	1
	Vinca alkaloids	Vincristine	41
		Vinblastine	10
		Vinorelbine	3
	Antibiotics	Doxorubicin	96
		Bleomycin	3
		Mitomycain	5
	Bisphosphonates	Zoledronic acid	88
	Gnrh agonist	Leuprolide acetate	22
		Goserelin	4
	Octapeptides	Octreotide	10
	Kinase inhibitors	Sunitinib	3
	Oestrogen receptor antagonists	Fulvestrant	5
	Aromatase inhibitor	Exemestane	1
	Colony stimulating factors	Filgrastim	471
	Leukemic cells killer	Pegaspergenase	5
	Purine analogues	Fludarabine	8
	Serotonin receptor antagonist	Ondansetron	340
	Proton pump inhibitor	Omeprazole	373
	Detoxifying agent	Calcium follinate	75
	Cytoprotectant	Mesna	35
	Anti-ulcer	Sucralfate	27
	Antibiotics	Co-amoxicalv	2
Syrups	Antidiarrheal agents	Ioperamide hcl	1
	Laxatives	Lactulose	2
		Magnesia	1
	Cough	Aminophylline	3
	Multivitamins	B1+b6+b12	2
	Antacids	Disodium hydrogen citrate	2
Oral drops	Antifungals	Nystatin	5
Capsules	Cereblon modulators	Lenalidomide	2
Tablets	Antineoplastics	Capcitabine	53
	Non-steroidal aromatase inhibitors	Letrozole	14
	Alkylating agents	Temozolamide	14
	Antiandrogens	Bicalutamide	17
	Selective estrogenic receptor modulators	Tamoxifen	4
	Kinase inhibitors	Palbociclib	3
	Multivitamins	Surbex z	11
		Centab	4

Continued.

Dosage forms	Class of drugs	Drugs	Frequency
	Neurokinin antagonist	Aprepitant	33
	CNS depressant	Alprazolam	3
		Lorazepam	1
	Phenothiazines	Prochlorperazine maleate	3
	Dopamine antagonist	Domperidone	26
	Anticonvulsant	Pregabalin	13
Infusions	Infusions	Normal saline	650
		5% dextrose	310
		Ringer lactate	239
		Sterofundin	2
		Mannitol	230
		Biseko	10

Table 3: WHO indicators Comparison with other studies.

WHO indicators	Study result	Hyderabad[18]	Southern Rajasthan[19]	Brazil[20]	Jordon[20]	South India[21]
Average number of drugs per prescription	8.36	6.01	6.75	-	-	12.22
Avg. number of anticancer drug/prescription	2.27	1.27	1.97	2.4	2.3	1.73
Avg. Adjuvant drug/prescription	4.93	4.73	3.2	-	-	-
Percentage of drug prescribed by generic name	71%	77%	-	-	-	20%
Percent of drug prescribed by EML	85%	82%	-	-	-	99%

DISCUSSION

The elucidation of drug utilization patterns within oncological settings is crucial for optimizing cancer treatment protocols and minimizing adverse effects associated with cancer pharmacotherapy. Drug utilization studies, as observed in the specialized cancer hospital data, serve a pivotal role in assessing prescribing habits, potentially unveiling the propensity for non-optimal drug use. These studies are instrumental in evaluating the efficacy of current prescribing practices against the backdrop of established clinical guidelines and the statistical validity of various drugs in oncological treatment paradigms, thereby informing policy-making and clinical practice improvements.

The demographic distribution of cancer prevalence, with a higher incidence in females (59% female vs. 41% male), aligns with global observations and underscores the importance of gender-specific cancer research and treatment strategies.[21] This gender disparity in cancer incidence, characterized by a female-to-male ratio of approximately 1.43%, mirrors the findings of other studies, although the underlying causes remain multifaceted and warrant further investigation.[22,23] The age distribution data further highlight the predominance of cancer in the 51-60 year age group, suggesting a critical focus area for targeted cancer screening and prevention programs.

Geographical variations in cancer incidence, as observed across different districts, reveal the influence of environmental factors on cancer prevalence. The notable variation in patient distribution, with the highest prevalence in Peshawar, suggests that geographical and environmental factors, including humidity and altitude, may play a role in cancer epidemiology, necessitating region-specific cancer prevention and treatment strategies.

The classification of cancer types within the patient cohort reflects the broad spectrum of oncological disorders treated at the hospital, with carcinoma being the most prevalent. The observed predominance of breast cancer aligns with global trends, underscoring the need for continued emphasis on breast cancer screening and research.[21] The distribution of other cancer types, including sarcomas, lymphomas and myelomas, highlights the diverse nature of cancer and the complexity of oncological care.[24-34] The prescribing patterns identified in the study, particularly the reliance on platinum compounds and anti-metabolites as the primary classes of cytotoxic agents, reflect current oncological pharmacotherapy trends. However, the observed variation in the average number of drugs prescribed per prescription compared to other studies indicates potential areas for optimization in prescribing practices, emphasizing the need for adherence to clinical guidelines and the rational use of polypharmacy.[36] The study's findings regarding the use of drugs from the WHO essential medicines list (EML) and the preference for

generic names in prescriptions are noteworthy. These findings highlight the ongoing efforts to align cancer treatment practices with international standards and recommendations, aiming to enhance the quality and cost-effectiveness of care.[36]

Our study offers valuable insights into the patterns of anticancer medication utilization and cancer incidence. However, it is important to acknowledge certain limitations. The investigation's concentration on a solitary specialized cancer hospital in Peshawar potentially restricts the broader applicability of our findings across different locales or healthcare environments. Additionally, while the World Health Organization's prescribing indicators provide a robust methodological framework for our evaluation, they might not encompass every pertinent dimension of drug utilization patterns. These include factors like medication adherence and individual patient characteristics that could significantly impact prescribing practices.

CONCLUSION

This study contributes valuable insights into the prescribing patterns of anticancer drugs, underscoring the critical need for ongoing evaluation and adjustment of oncological pharmacotherapy practices to align with best practice guidelines and WHO standards. The observed demographic and geographical trends in cancer prevalence further emphasize the need for tailored cancer prevention and treatment strategies. Future research should focus on addressing the identified gaps in prescribing practices and exploring the underlying factors contributing to geographical and gender disparities in cancer incidence.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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