ORIGINAL ARTICLE

Evaluation the Impact of Pharmacist Lead Medication Counseling in Oncology Words

Abdulrahman A. Bin Alamir[1], Ruba A. Alghamdi[2], Wasan A. Alghamdi[2], Shaden A. Alghamdi[2], Haneen A. Alghamdi[2], Ghadi A. Alghamdi[2], Raghad B. Benmohi[3], Adwaa A. Aljuhani[3], Khames T. Alzahrani[4]

[1]Department of Pediatrics, College of Medicine, Majmaah University, Majmaah, Kingdom of Saudi Arabia, [2]Department of Pediatrics, College of Medicine, Al-Baha University, Al-Baha, Saudi Arabia, [3]Department of Pediatrics, College of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia, [4]Department of Endodontics, PGD Endo from Stanford University, Saudi Board of Endodontics, King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia

Abstract

Introduction: Cancer remains one of the most significant global health challenges, causing over 10 million deaths in 2020 and projected to reach 22 million new cases annually by 2040. Disparities in early diagnosis and effective treatment, particularly in low- and middle-income countries, contribute to higher mortality rates. Chemotherapy is a cornerstone of cancer treatment, often used in combination regimens or alongside targeted therapies and immunotherapy to enhance outcomes. However, adherence to treatment remains a challenge, and the role of pharmacists in supporting oncology patients through education and counseling has shown promising yet underexplored results in certain settings. **Objective:** Our study aims to assess patients' perceptions, experiences, and satisfaction in general with specialized clinical pharmacist consultations while receiving oral chemotherapy in Saudi Arabia. **Methodology:** This cross-sectional multicenter study was conducted in the oncology wards of tertiary care hospitals in Saudi Arabia between July 2025 and December 2025. Adult cancer patients receiving oral chemotherapy were recruited using convenience sampling. Data were collected using a culturally adapted version of the Cancer Services Pharmacist Questionnaire, which included demographic information and 16 items rated on a 5-point Likert scale to assess perceived benefits of pharmacist counseling, patient confidence, knowledge gained, medication adherence, and availability of support services. A scoring system based on Bloom's cut-off points was used to categorize awareness levels as good, moderate, or poor. **Results:** The participant cohort was majority female (≈80%), highly educated (62.3% with bachelor's degrees), with a mean age of 37.5 years. About one-third reported personal/family cancer history; most had never previously received pharmacist counseling (79.3%). Following intervention, 85% of respondents agreed or strongly agreed that clinical pharmacists play a key role in inpatient care, medication management, enhancing outcomes, and reducing medication errors. Awareness of pharmacist contributions was high (56.4% high, 30.7% moderate). Awareness levels were significantly associated with gender, age, income, residential area, educational level, marital status, oncology admission, and prior counseling (all $P < 0.05$). Disagreement on pharmacist value or knowledge was rare (<3%). **Conclusion:** Structured pharmacist-led counseling in oncology wards substantially increases patient awareness and positive perceptions of pharmacists' roles, supporting recommendations for expanded pharmacist involvement in cancer care teams in Saudi Arabia.

Key words: Awareness, clinical pharmacist, oncology, treatment adherence

INTRODUCTION

Cancer is a multifaceted disease characterized by abnormal and uncontrolled cell growth, which can invade surrounding tissues and metastasize to distant organs, representing one of the most significant public health challenges worldwide.[1] Its development is influenced by genetic mutations, environmental exposures, and

Address for correspondence:
Khames T. Alzahrani, PGD Endo from Stanford University, Saudi Board of Endodontics, KingFaisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia.
E-mail: dr.khames.alzahrani@gmail.com

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lifestyle-related risk factors, making it a complex condition with diverse clinical manifestations.[2] Chemotherapy remains a cornerstone of cancer treatment, employing cytotoxic agents that interfere with essential cellular processes such as DNA replication and mitosis, thereby inducing apoptosis in rapidly dividing cells.[3] However, despite its effectiveness in suppressing tumor progression and improving survival, chemotherapy is often associated with substantial toxicity due to its impact on normal proliferating tissues, underscoring the need for optimized regimens and supportive care strategies.[4]

Multiple studies have indicated that the global number of new cancer cases has reached roughly 18 million.[5] The national annual cancer incidence is estimated at about 101.7 new cases/100,000 individuals, equating to nearly 30,500 new diagnoses every year.[6] Breast cancer is the most prevalent type of cancer affecting women globally. In Europe, the current incidence rate is approximately.[7] Cancer is the leading cause of death in China, with rising incidence and mortality. Pain remains a major concern, affecting 59% of patients on treatment, 64% with advanced disease, and 33% after curative therapy.[8]

Number of researches have discussed the importance of pharmacists in supporting oncology patients through medication counseling, but there are some gaps that remain. In 2019, Edwards *et al*. carried out a systematic review that comprised both quantitative and qualitative research with the goal of assessing the efficacy of information given to patients regarding their drugs. One hundred and twenty-two researches from different nations were considered in the study. However, cancer patients were not the specific target of this investigation.[9] Kabel *et al*., on the other hand, carried out an interventional study in 2020 at a hospital in Jordan to assess how clinical pharmacist consultations affected the adherence of cancer patients to their treatment regimens. The study included one hundred patients. The usefulness of direct teaching in enhancing therapy was demonstrated by the study's finding that the rate of non-adherence dropped from 41% to 17% after the pharmacist intervention.[10] In study done by Mackler *et al*. looked at a pharmacist-led program for the treatment of patients undergoing oral chemotherapy. Patients who participated in the training reported fewer drug problems and increased awareness of potential side effects. However, because the study only looked at oral medications and only included a small number of patients, the findings cannot be easily extrapolated to other cancer treatment settings.[11] In 2025 studied 48 oncology patients in palliative care and found that 25.2% of medications were inappropriate for patients (an average of 2.4 medications/patient). Pharmacists' recommendations to reduce medication were implemented in 71.7% of cases, resulting in a reduction of 1.7 medications per patient and a savings of €948.27 over 28 days. The results highlight the role of pharmacists in reducing medication burden and costs.[12]

Many previous studies were either focused on general drug counseling without specifically targeting oncology patients, or they were limited in scope, covering only oral chemotherapy, juvenile groups, or lacked consistent recording standards. Furthermore, the direct impact of systematic pharmacist education on primary care provider (PCP) recording in inpatient cancer settings has not been extensively studied. This emphasizes how important it is to go over the subject again from a wider and more useful perspective. Consequently, to fill these gaps, we investigated whether an educational intervention could enhance clinical pharmacists' PCP documentation in terms of both number and quality. Particularly in specializations such as adult cancer and palliative care, the disparity in care plan documentation is one of the primary reasons to revisit this subject. By improving clinical pharmacy practices and fostering interdisciplinary teamwork, we expect to improve oncology care results and patient safety.

Objectives

This study aims to evaluate the impact of pharmacist-led medication counseling on improving patients' understanding of chemotherapy regimens and medication adherence in oncology wards.

METHODOLOGY

Study design and setting

This study adopted a cross-sectional design to assess adherence to oral chemotherapy treatment among cancer patients. The study was conducted in Saudi Arabia between July 2025 and December 2025 at hospitals offering specialized oncology services. Conducting the research across multiple hospitals ensured the inclusion of a diverse population of patients receiving chemotherapy for various cancer types and stages.

Subject: Participants, recruitment, and sampling procedure

The study included adult cancer patients admitted to oncology wards during the study period. Participants were selected based on a confirmed cancer diagnosis and current use of oral chemotherapy or supportive medications. Eligible patients were identified through the hospital oncology patient registry in collaboration with the oncology care team. A research pharmacist explained the purpose of the study and obtained informed consent prior to participation. A convenience sampling method was used to recruit participants who met the inclusion criteria and were available during the study timeframe.

Inclusion and exclusion criteria

Individuals who have been diagnosed with cancer and are undergoing oral chemotherapy are eligible to participate.

Patients admitted to the participating hospital's oncology wards, mentally healthy individuals who can comprehend and engage in therapy sessions, participants in the study who give their written informed consent, and patients who are at least 18 years old. Patients undergoing solely non-chemotherapy treatments (such as surgery or radiation therapy alone) are excluded from the study.

Method for data collection, instrument

We used a structured questionnaire that was based on the Cancer Services Pharmacist Questionnaire produced by McNabb *et al*.[13] Originally intended for outpatient settings, the tool was adapted to fit the cultural and clinical context of the study, concentrating on inpatient cancer wards.

The questionnaire was used to find out what patients thought about getting advice from a clinical pharmacist about using oral chemotherapy. The updated version preserved the same order as the original to make sure it was valid and comparable, but changed the wording and context to better fit the research group. The questionnaire consists of two parts. A permission declaration, demographic information including age, gender, education level, and first language, as well as a brief explanation of the study, are all included in Part 1. Part 2 contains sixteen 5-point Likert-scale questions evaluating the perceived benefits of pharmacist counseling, patient confidence, knowledge gained, necessity of the pharmacist's role, medication adherence, and available support services. With the authors' permission, the questionnaire was adopted from their original study to ensure validity and comparability of results.

Scoring system

A total of 26 statements were used to assess participants' awareness, including 10 sociodemographic items (not scored) and 16 awareness-related items. The maximum possible score was 80. Participants were categorized into three groups based on their total scores. Awareness was assessed using a 16-item questionnaire with the following response options: strongly agree (5 points), agree (4 points), neutral (3 points), disagree (2 points), strongly disagree (1 point), and "I do not know" (0 points). The total awareness score ranged from 0 to 80. The overall level of awareness was determined using predefined cut-off points: scores of 70–80 indicated good awareness, scores of 60–69 indicated moderate awareness, and scores below 60 indicated poor awareness.

Pilot test

The questionnaire was distributed to 20 individuals, who were asked to fill it out. This was done. To test the simplicity of the questionnaire and the feasibility of the study, data of the pilot study were excluded from the final data of the study.

Analyzes and entry method

Data were entered using Microsoft Office Excel for Windows (2021). The collected data were subsequently transferred to the Statistical Package for the Social Sciences (SPSS), version 25 (IBM SPSS Statistics for Microsoft Windows) for statistical analysis. Descriptive statistics were used to summarize numerical variables and baseline characteristics. Frequencies and percentages were calculated for categorical variables. The Chi-square test was used to examine associations between categorical variables.

RESULTS

Table 1 displays various demographic parameters of the participants with a total number of (512). Age distribution shows that the mean age was 37.5, with 34% aged 45 or more. The proportion of female participants is also large (79.9%). The level of income is fairly balanced, with 28% earning more than 10000 SAR/month. The geographical distribution gives concentration around the Southern region. Interestingly, there is a significant proportion of people (34.6) who have or their family has cancer. Although the proportion of those who have never received pharmacist-led counseling (79.3%) or cancer treatment (83.6%), the educational level is relatively high, and high percentages of participants have a bachelor's degree (62.3%). The marital status information shows that more than 50% of the participants are married (54.5%).

As shown in Figure 1, most participants (59.2%) strongly agreed, and 27.7% agreed that clinical pharmacists play an important role in inpatient care, while 9.6% were neutral. Only 2.3% disagreed, and 0.6% strongly disagreed, with 0.6% unsure.

Table 2 shows that the perceptions towards pharmacist-led medication counseling in oncology wards are overwhelmingly positive. Most of the respondents mostly concurred that

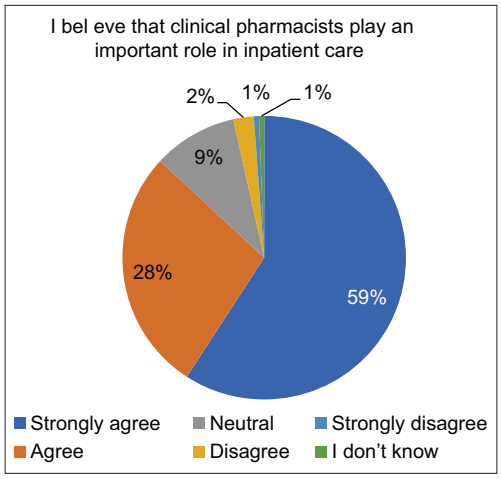

Figure 1: Illustrates whether clinical pharmacists play an important role in inpatient care among participants

Table 1: Sociodemographic characteristics of participants (*n*=512)

Parameter	No.	Percentage
Age (Mean: 37.5, Standard deviation: 12.8)		
18–23	118	23.0
24–34	100	19.5
35–45	122	23.8
More than 45	172	33.6
Gender		
Female	409	79.9
Male	103	20.1
Income level in SAR		
<3000	136	26.6
3000–5000	82	16.0
6000–10000	150	29.3
More than 10000	144	28.1
Residential area		
Northern region	18	3.5
Southern region	191	37.3
Central region	136	26.6
Eastern region	50	9.8
Western region	117	22.9
Are you currently diagnosed with cancer, or is one of your relatives diagnosed with it?		
No	335	65.4
Yes	177	34.6
Are you or any of your family members currently admitted to the oncology department in the hospital?		
No	433	84.6
Yes	79	15.4
Have you ever attended a medication counseling session by a pharmacist during your treatment period?		
No	406	79.3
Yes	106	20.7
Have you ever received cancer medication treatment (such as chemotherapy or oral chemotherapy)?		
No	428	83.6
Yes	84	16.4
Educational level		
Primary school	1	0.2
Intermediate school	21	4.1
High school	56	10.9
Bachelor's degree	319	62.3
Diploma	64	12.5
Postgraduate studies	45	8.8
No formal education	6	1.2
Marital status		
Single	187	36.5
Married	279	54.5
Widowed	12	2.3
Divorced	34	6.6

(Contd...)

Table 2: Parameters related to awareness of the impact of pharmacist lead medication counseling in oncology words (*n*=512)

Parameter	No.	Percentage
I believe that clinical pharmacists play an important role in inpatient care		
Strongly agree	303	59.2
Agree	142	27.7
Neutral	49	9.6
Disagree	12	2.3
Strongly disagree	3	0.6
I don't know	3	0.6
Clinical pharmacists are essential for medication management in inpatient settings		
Strongly agree	286	55.9
Agree	162	31.6
Neutral	46	9.0
Disagree	12	2.3
Strongly disagree	3	0.6
I don't know	3	0.6
Inpatient care benefits significantly from the involvement of clinical pharmacists		
Strongly agree	285	55.7
Agree	159	31.1
Neutral	59	11.5
Disagree	5	1.0
Strongly disagree	1	0.2
I don't know	3	0.6
I trust clinical pharmacists to provide optimal medication therapy in inpatient care		
Strongly agree	286	55.9
Agree	155	30.3
Neutral	57	11.1
Disagree	7	1.4
Strongly disagree	5	1.0
I don't know	2	0.4
The presence of clinical pharmacists improves patient outcomes in inpatient settings		

(Contd...)

Table 2: *(Continued)*

Parameter	No.	Percentage
Strongly agree	290	56.6
Agree	163	31.8
Neutral	44	8.6
Disagree	12	2.3
Strongly disagree	1	0.2
I don't know	2	0.4
I believe clinical pharmacists contribute to reducing medication errors in inpatient care		
Strongly agree	299	58.4
Agree	150	29.3
Neutral	51	10.0
Disagree	9	1.8
Strongly disagree	1	0.2
I don't know	2	0.4
Clinical pharmacists are knowledgeable about inpatient medication protocols		
Strongly agree	291	56.8
Agree	156	30.5
Neutral	48	9.4
Disagree	12	2.3
Strongly disagree	1	0.2
I don't know	4	0.8
I feel confident in the recommendations provided by clinical pharmacists in inpatient care		
Strongly agree	285	55.7
Agree	171	33.4
Neutral	47	9.2
Disagree	5	1.0
Strongly disagree	1	0.2
I don't know	3	0.6

clinical pharmacists are significant in inpatient care (59.2%) and are needed in medication management (55.9%). On the same note, 56.6% strongly affirmed that their presence enhances patient outcomes, also 58.4% agreed that they help in preventing medication erosion. There was also a sense of confidence and trust when it came to five out of ten strongly agreeing on whether they feel confident in the pharmacist recommendations. Agreement was over 85% in all the parameters and indicated general awareness of the clinical value of pharmacists. The percentage of those who disagreed was only a small percentage (<3%).

As shown in Figure 2, more than half of the participants (55.9%) strongly agreed, and 32.4% agreed that inpatient care would benefit from increased involvement of clinical pharmacists. Only 9.6% were neutral, while 1.4% disagreed, 0.4% strongly disagreed, and 0.4% were unsure.

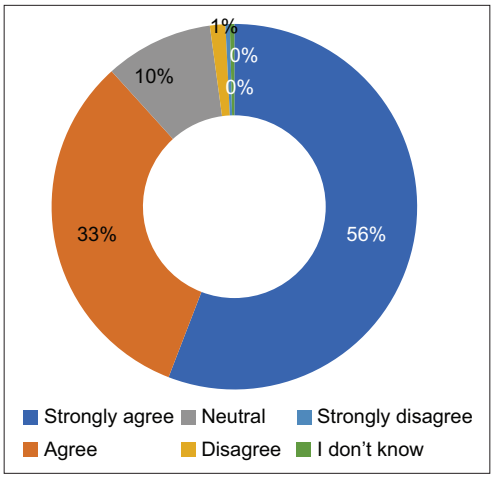

Figure 2: Illustrates inpatient care would benefit from increased involvement of clinical pharmacists among participants

Table 3 demonstrates that there is a high level of awareness and positive view towards pharmacist-led medication counseling among the participants of the oncology ward. There was a strong agreement among most respondents that inpatient care would benefit with the role of a clinical pharmacist (55.9%) and the role of collaboration between them and physicians (64.8%). Pharmacist services awareness was a little lesser with 45.1% strongly agreeing. Pharmacists performed well in education (56.1% and medication safety (56.3%), which had a high confidence level. In addition, a large percentage, 58.8%, highly approved the idea of expanding the role of a pharmacist and making them part of the regular team. The general consensus was over 85% on all parameters, and the levels of disagreement were <2%.

Table 4 shows that most participants demonstrated a high level of awareness about the impact of pharmacist-led medication counseling in oncology wards (56.4%), while 30.7% had a moderate level of awareness. Only 12.9% of participants showed a low level of awareness.

Table 5 shows that awareness about impact of pharmacist lead medication counseling in oncology has statistically significant relation with gender ($P = 0.007$), age ($P = 0.0001$), income level ($P = 0.0001$), residential area ($P = 0.0001$), admission to oncology department ($P = 0.001$), attending a medication counseling session ($P = 0.031$), educational level ($P = 0.001$), and marital status ($P = 0.0001$).

DISCUSSION

The present study aimed to evaluate the impact of pharmacist-led medication counseling on patient awareness, perceptions, and adherence among cancer patients in oncology wards within Saudi Arabia. The underlying premise was that direct, structured involvement by clinical pharmacists

Table 3: Awareness of the impact of pharmacist lead medication counseling in oncology words among participants (*n*=512)

Parameter	No.	Percentage
Inpatient care would benefit from increased involvement of clinical pharmacists		
Strongly agree	286	55.9
Agree	166	32.4
Neutral	49	9.6
Disagree	7	1.4
Strongly disagree	2	0.4
I don't know	2	0.4
The collaboration between physicians and clinical pharmacists enhances inpatient care		
Strongly agree	332	64.8
Agree	136	26.6
Neutral	32	6.3
Disagree	9	1.8
Strongly disagree	1	0.2
I don't know	2	0.4
I am aware of the services provided by clinical pharmacists in inpatient settings		
Strongly agree	231	45.1
Agree	155	30.3
Neutral	88	17.2
Disagree	24	4.7
Strongly disagree	4	0.8
I don't know	10	2.0
Clinical pharmacists play a key role in patient education in inpatient care		
Strongly agree	287	56.1
Agree	161	31.4
Neutral	47	9.2
Disagree	9	1.8
Strongly disagree	3	0.6
I don't know	5	1.0
I believe that clinical pharmacists improve medication safety in inpatient care		
Strongly agree	288	56.3
Agree	179	35.0
Neutral	34	6.6
Disagree	6	1.2
Strongly disagree	1	0.2
I don't know	4	0.8
I would recommend increasing the involvement of clinical pharmacists in inpatient care		
Strongly agree	301	58.8
Agree	164	32.0
Neutral	40	7.8
Disagree	4	0.8
Strongly disagree	1	0.2
I don't know	2	0.4
Inpatient care teams should include clinical pharmacists as standard members		
Strongly agree	301	58.8
Agree	160	31.3
Neutral	40	7.8
Disagree	8	1.6
Strongly disagree	1	0.2
I don't know	2	0.4
I believe clinical pharmacists significantly contribute to inpatient care quality		
Strongly agree	309	60.4
Agree	159	31.1
Neutral	37	7.2
Disagree	3	0.6
Strongly disagree	2	0.4
I don't know	2	0.4

Table 4: Shows awareness about impact of pharmacist lead medication counseling in oncology score results

Level of awareness	Frequency	Percentage
High level of awareness	289	56.4
Moderate awareness	157	30.7
Low level of awareness	66	12.9
Total	512	100.0

would improve patient confidence, knowledge, medication safety, and collaboration within the healthcare team. Our results demonstrated a predominance of positive perception and high awareness regarding the pharmacist's role among participants, echoing findings from related international and regional research.

Our participants exhibited high rates of agreement (over 85%) on the value and necessity of clinical pharmacists in inpatient care, medication management, and patient outcomes. This is consonant with evidence from global systematic reviews and meta-analyses, which affirm that pharmacist-led interventions significantly enhance treatment adherence, medication safety, and overall quality of life among cancer patients.[14-16] For example, a 2025 meta-analysis found that pharmacist involvement in oncology settings led to statistically significant reductions in adverse drug reactions (notably nausea and vomiting), improved pain management (odds ratio = 1.99), and notably higher medication adherence,

Table 5: Relation between awareness about impact of pharmacist lead medication counseling in oncology

Parameters	Awareness level		Total (*n*=512) (%)	*P*-value
	High level of awareness (%)	Moderate or low awareness (%)		
Gender				
Female	243 (84.1)	166 (74.4)	409 (79.9)	0.007
Male	46 (15.9)	57 (25.6)	103 (20.1)	
Age				
18–23	94 (32.5)	24 (10.8)	118 (23.0)	0.0001
24–34	58 (20.1)	42 (18.8)	100 (19.5)	
35–45	56 (19.4)	66 (29.6)	122 (23.8)	
More than 45	81 (28.0)	91 (40.8)	172 (33.6)	
Income level				
<3000	100 (34.6)	36 (16.1)	136 (26.6)	0.0001
3000–5000	40 (13.8)	42 (18.8)	82 (16.0)	
6000–10000	72 (24.9)	78 (35.0)	150 (29.3)	
More than 10000	77 (26.6)	67 (30.0)	144 (28.1)	
Residential area				
Northern region	7 (2.4)	11 (4.9)	18 (3.5)	0.0001
Southern region	128 (44.3)	63 (28.3)	191 (37.3)	
Central region	59 (20.4)	77 (34.5)	136 (26.6)	
Eastern region	24 (8.3)	26 (11.7)	50 (9.8)	
Western region	71 (24.6)	46 (20.6)	117 (22.9)	
$A=\pi r^2$ you currently diagnosed with cancer, or is one of your family members diagnosed with it?				
No	186 (64.4	149 (66.8)	335 (65.4)	0.562
Yes	103 (35.6)	74 (33.2)	177 (34.6)	
Are you or any of your family members currently admitted to the oncology department in the hospital?				
No	258 (89.3)	175 (78.5)	433 (84.6)	0.001
Yes	31 (10.7)	48 (21.5)	79 (15.4)	
Have you ever attended a medication counseling session by a pharmacist during your treatment period?				
No	239 (82.7)	167 (74.9)	406 (79.3)	0.031
Yes	50 (17.3)	56 (25.1)	106 (20.7)	
Have you ever received cancer medication treatment (such as chemotherapy or oral chemotherapy)?				
No	249 (86.2)	179 (80.3)	428 (83.6)	0.074
Yes	40 (13.8)	44 (19.7)	84 (16.4)	
Educational level				
Primary school	0 (0.0)	1 (0.4)	1 (0.2)	0.001
Intermediate school	7 (2.4)	14 (6.3)	21 (4.1)	
High school	29 (10.0)	27 (12.1)	56 (10.9)	
Bachelor's degree	201 (69.6)	118 (52.9)	319 (62.3)	
Diploma	28 (9.7)	36 (16.1)	64 (12.5)	
Postgraduate studies	24 (8.3)	21 (9.4)	45 (8.8)	
No formal education	0 (0.0)	6 (2.7)	6 (1.2)	

(Contd...)

Table 5: *(Continued)*

Parameters	Awareness level		Total (*n*=512) (%)	*P*-value
	High level of awareness (%)	Moderate or low awareness (%)		
Marital status				
Single	128 (44.3)	59 (26.5)	187 (36.5)	0.0001
Married	147 (50.9)	132 (59.2)	279 54.5)	
Widowed	5 (1.7)	7 (3.1)	12 (2.3)	
Divorced	9 (3.1)	25 (11.2)	34 (6.6)	

**P*-value was considered significant if ≤0.05

with patients in the intervention group being four times more likely to comply with their regimens compared to standard care.[14] Similar improvements in health-related quality of life and reduction in medication-related problems have been documented among elderly cancer populations and across both high- and middle-income countries.[15,16]

Studies in Saudi Arabia and other Middle Eastern contexts describe comparable trends. The majority of published work highlights that pharmacist counseling and education, whether conducted in inpatient or outpatient oncology settings, results in improved patient understanding of chemotherapy protocols, confidence in managing side effects, and increased trust in interdisciplinary teams.[17,18] Research from Riyadh and northern regions, for instance, underscores persistent barriers to optimal pharmaceutical consultation, primarily due to workflow and time constraints, but documents substantial declines in preventable adverse drug events (ADEs) following implementation of pharmacist-led education programs.[19,20]

Our study population was predominantly female, highly educated, with about one-third having a personal or family history of cancer, and most had not received prior pharmacist counseling. After intervention, the overwhelming consensus about pharmacists' value in medication safety, patient education, and medication management mirrors the global consensus that clinical pharmacy services are essential to cancer care.[14-16] Recent systematic reviews echo that pharmacist-led interventions reduce ADEs, enhance therapy optimization, and foster patients' self-efficacy in medication adherence and symptom management.[21-23]

Particularly relevant is the growing evidence supporting expansion of pharmacists' roles as routine team members in oncology wards. Recent studies advocate for structured pharmacist involvement in discharge planning, patient education, pain management, and regular medication reconciliation, all significantly reducing therapy-related risks and improving longitudinal outcomes.[14,16,23] Intervention studies in Middle Eastern settings support integrating pharmacists to address region-specific barriers, including language, cultural factors, and healthcare infrastructure limitations.[18,20]

Nevertheless, this study is not without limitations. The cross-sectional design precludes causal inference. Data were collected through self-reported measures, which may introduce recall and social desirability biases. Despite a relatively large and demographically varied sample, the lack of randomization and restriction to certain tertiary hospitals in Saudi Arabia may limit external generalizability. Workflow factors, time constraints, and potential inter-institutional differences were not systematically captured and might have influenced patients' perceptions and the implementation of pharmacist counseling. Future studies should aim for multi-site randomized controlled designs and seek to correlate pharmacist interventions with objective clinical outcomes such as readmissions, complications, and cost-effectiveness.

CONCLUSION

This study demonstrates that pharmacist-led medication counseling significantly elevates oncology patients' awareness and positive perceptions toward medication management and safety in Saudi hospitals. Incorporating clinical pharmacists as integral members of oncology care teams has the potential to improve patient outcomes and medication adherence. Widespread implementation, coupled with future randomized and multicentric studies, is warranted to maximize these benefits and further optimize patient-centered cancer care.

ACKNOWLEDGMENT

We acknowledge all volunteers who provided samples for this research.

ETHICAL APPROVAL

The study was fully explained to all participants, and it was emphasized that participation was voluntary. Written informed consent was obtained from each participant before enrollment. All collected information was securely stored and used exclusively for research purposes.

INFORMED CONSENT

Written informed consent was obtained from all study participants.

DATA AND MATERIALS AVAILABILITY

All data generated or analyzed during this study are included in this published article.

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