

A Review on the Role of Pharmacist Interventions in Identifying and Resolving Drug-Related Problems Among Chronic Kidney Disease Patients

Ms. Fahmidha Abdul Lateef*, Mrs. Vineetha S¹ and Mr. Tamilselvan T²

¹Associate Professor, Department of Pharmacy Practice, Nehru College of Pharmacy, Thiruvilwamala, Pampady, Thrissur, Kerala 680588, INDIA.

²Professor, Department of Pharmacy Practice, Nehru College of Pharmacy, Thiruvilwamala, Pampady, Thrissur, Kerala 680588, INDIA

*Master of Pharmacy Student, Department of Pharmacy Practice, Nehru College of Pharmacy, Thiruvilwamala, Pampady, Thrissur, Kerala 680588, INDIA.

*Corresponding Author: fahmidhalateef@gmail.com



www.jrasb.com || Vol. 4 No. 4 (2025): August Issue

Received: 09-08-2025

Revised: 13-08-2025

Accepted: 18-08-2025

ABSTRACT

Background: Chronic Kidney Disease (CKD) is a progressive condition marked by declining renal function and a growing burden of comorbidities. The complexity of pharmacotherapy in CKD leads to a high prevalence of drug-related problems (DRPs). Clinical and community pharmacists play a vital role in the identification and resolution of these problems. However, in many developing countries including India, the role of clinical pharmacists in nephrology care is still underutilized, highlighting the need for greater integration into healthcare teams. **Objective:** This review aims to explore and evaluate the role and impact of pharmacist interventions on DRPs in CKD patients based on data extracted from key studies conducted globally. **Methods:** A structured review was carried out using recent literature from PubMed, Scopus, BMC, MDPI, Cureus, and other databases published. The review included randomized controlled trials, prospective studies, and systematic reviews focused on pharmacist-led interventions in CKD patients. **Result:** In CKD patients, the prevalence of drug-related problems (DRPs) has been reported between 30% and 76%, varying by study design and population. The most common DRPs included dosing errors, adverse drug reactions, and drug-drug interactions, followed by untreated indications and unnecessary therapies. Pharmacist interventions consistently reduced DRPs by 60–80%, improved adherence and quality of life, and achieved 65–80% resolution rates with high prescriber acceptance. **Conclusion:** Pharmacist interventions, particularly as part of multidisciplinary care, have been shown to markedly decrease drug-related problems, enhance therapeutic effectiveness, and improve overall patient outcomes. It remains essential to establish standardized methods for DRP classification and to strengthen the role of pharmacists across both hospital and community healthcare settings.

Keywords- Chronic Kidney Disease, Drug-Related Problems, Pharmacist Intervention, Clinical Pharmacy, Patient Safety, Multidisciplinary Care.

I. INTRODUCTION

Chronic Kidney Disease (CKD) is a progressive and irreversible condition characterized by a gradual decrease in renal function, ultimately leading to end-stage renal disease (ESRD) if it is untreated. It is recognized as a significant global health burden due to its high prevalence, association with comorbidities such as

hypertension, diabetes, and cardiovascular disease, and its contribution to increased morbidity and mortality rates [1,2]. Patients with CKD often require complex drug regimens, and the altered pharmacokinetics and pharmacodynamics associated with renal impairment increase their susceptibility to drug-related problems (DRPs) [3,4].



Drug-related problems are defined as events or circumstances involving drug therapy that actually or potentially interfere with desired health outcomes. The most commonly reported DRPs in CKD patients include adverse drug reactions, drug–drug interactions, untreated indications, unnecessary drug therapy, improper drug selection, and inappropriate dosing [5,6,7]. Polypharmacy, multiple comorbidities, and advanced age are among the strongest predictors of DRPs [8,9]. These problems not only compromise patient safety but also contribute to prolonged hospital stays, higher healthcare costs, and increased mortality [10,11].

Over the past decade, pharmacists have been increasingly recognized as key members of the healthcare team in preventing and managing DRPs in CKD patients. Clinical pharmacists contribute through interventions such as dose adjustment, discontinuation of inappropriate drugs, initiation of necessary therapies, therapeutic substitution, patient counselling, and regular monitoring [4,7,12]. Several randomized controlled trials, observational studies, and systematic reviews have demonstrated that pharmacist-led interventions significantly reduce the prevalence and severity of DRPs, improve medication adherence, enhance quality of life, and decrease hospital readmissions [1,4,9,13].

Recent studies in both hospital and community settings have highlighted the effectiveness of pharmacist involvement in CKD management. For example, pharmacist-led interventions were associated with DRP resolution rates of 65–80% and high acceptance among prescribers [2,8,9]. Community pharmacy-based studies further revealed that structured training and communication networks enhanced the ability of pharmacists to detect and resolve DRPs [7,8]. Systematic reviews have consistently supported these findings, concluding that pharmacist participation reduces DRPs by 60–80% and improves patient outcomes [1,13].

Despite this growing evidence, the role of pharmacists in CKD care remains underutilized in several regions, particularly in developing countries. Barriers such as lack of standardized DRP classification systems, limited integration of clinical pharmacists into nephrology care teams, and inadequate infrastructure hinder the full implementation of pharmacist-led services [11,12]. Nevertheless, the cumulative evidence strongly supports expanding pharmacist involvement to optimize CKD management and ensure patient-centered care.

II. METHODOLOGY

This review was conducted by systematically searching electronic databases including PubMed, Scopus, MDPI, BMC, and Web of Science for articles published between 2021 and 2025. The search was restricted to English-language publications using the keywords: “*pharmacist interventions*,” “*drug-related problems*,” “*CKD*,” “*chronic kidney disease*,” and “*clinical pharmacy*.” After screening titles and abstracts,

ten relevant peer-reviewed studies were selected, comprising randomized controlled trials, observational studies, and systematic reviews that specifically evaluated the impact of pharmacist interventions in the management of drug-related problems among CKD patients. Data from the included studies were extracted on study design, patient population, intervention strategies, types and prevalence of DRPs, and reported clinical outcomes. The extracted findings were then compared and synthesized to assess the overall effectiveness of pharmacist-led interventions in reducing DRPs, improving patient safety, and optimizing therapeutic outcomes in CKD care.

III. RESULTS

In the studies reviewed, the reported prevalence of drug-related problems (DRPs) in CKD patients ranged between 30% and 76%, influenced by study design, patient characteristics, and the healthcare environment [2,3,4,5]. The most frequently encountered DRPs were adverse drug reactions (ADRs), drug interactions, inappropriate drug selection, and dosing errors (both overdosing and sub-therapeutic dosing) [3,4,6,12]. Other common problems included untreated conditions, unnecessary medications, and failure to receive prescribed therapy [5,7,10]. Contributing factors such as polypharmacy and comorbidities like hypertension, diabetes, and cardiovascular diseases were consistently highlighted as major predictors of DRPs [2,9,12].

Pharmacist interventions were shown to be highly effective across different care models. In hospital-based studies, clinical pharmacists successfully resolved 65–80% of DRPs, with strong acceptance of their recommendations by prescribers [2,4,9,10]. Randomized trials demonstrated additional benefits, including better treatment outcomes, fewer hospital admissions, and improved patient adherence to therapy [4,9]. In community settings, structured pharmacist training and communication strategies enhanced the identification of untreated conditions and reduced inappropriate prescribing [7,8].

Evidence from systematic reviews and meta-analyses further reinforced these findings, indicating that pharmacist involvement reduced DRPs by 60–80%, while simultaneously improving safety, treatment outcomes, and quality of life [1,13]. Importantly, studies from countries with limited healthcare resources, such as China and Jordan, confirmed that clinical pharmacists still achieved measurable improvements in DRP prevention and management [3,10].

Taken together, the literature clearly demonstrates that pharmacist participation significantly reduces DRPs among CKD patients across both hospital and community care. Their interventions not only addressed medication errors and adverse reactions but also strengthened continuity of care and optimized long-term therapeutic outcomes [2,4,7,11].

IV. CONCLUSION

Across the reviewed studies, pharmacist-led interventions consistently demonstrated a significant positive impact on the identification, prevention, and resolution of drug-related problems (DRPs) in patients with chronic kidney disease (CKD). Clinical pharmacists contributed to optimizing medication therapy through thorough medication reviews, patient counseling, and interdisciplinary collaboration, which led to improved patient outcomes, reduced medication errors, and enhanced adherence. Both hospital-based and community pharmacy settings benefited from structured pharmacist involvement, showing reductions in DRP prevalence, severity, and associated complications. Systematic reviews, randomized controlled trials, and prospective studies highlighted that integrating pharmacists into CKD management not only ensures safer and more effective pharmacotherapy but also supports individualized patient care, emphasizing the critical role of pharmacists in multidisciplinary approaches for CKD management.

V. DISCUSSION

This review shows that drug-related problems (DRPs) are highly prevalent in CKD patients (30–76%), mainly due to polypharmacy, comorbidities, and complex treatment regimens. The most frequent DRPs were adverse drug reactions, drug interactions, and dosing errors, while untreated indications and unnecessary therapies were also common. Across studies, pharmacist-led interventions achieved **65–80% DRP resolution**, improved adherence, and reduced hospitalizations, with high prescriber acceptance. Community-based and systematic reviews confirmed that pharmacist involvement lowered DRPs by **60–80%** and improved quality of life. Even in resource-limited settings, pharmacists made significant contributions. Despite these benefits, limited integration of pharmacists into nephrology care persists, underscoring the need for standardized DRP classification and wider adoption of pharmacist services to optimize CKD management.

ACKNOWLEDGEMENT

The journey of learning is never walked alone. At every step we are guided, supported, and encouraged by those around us. With deep humility, we first thank the **Almighty** for showering blessings, granting us strength, and guiding us towards the successful completion of this work.

We extend our heartfelt gratitude to our respected **Head of the Department, Dr. T. Tamil Selvan, M. Pharm., Ph.D., Nehru College of Pharmacy**, for his invaluable support, encouragement, and for providing us with the resources and environment necessary to carry out this review.

Our profound thanks go to our guide, **Mrs. Vineetha S., Associate Professor, Department of Pharmacy Practice**, whose patience, constant supervision, and insightful advice have been the backbone of this work.

We also wish to acknowledge the unwavering love and encouragement of our **family and friends**, who stood by us with motivation and support throughout this journey.

REFERENCES

- [1] Ashkon Ardavani et.al., The effect of pharmacist-led interventions on the management and outcomes in chronic kidney disease (CKD): A systematic review and meta-analysis protocol, health science report, 2023, 14;6(1):1064.
- [2] Zhang S et al., Drug-related problems in hospitalized patients with chronic kidney diseases and clinical pharmacist interventions. BMC Geriatrics, 2023 Dec 13;23(1):849.
- [3] Xing-Xing Liu et.al., Drug-related problems identified by clinical pharmacists in nephrology department of a tertiary hospital in China-a single center study, annals of palliative medicines, 2021;10(8):8701-8708
- [4] Yun kyoung song et.al., effectiveness of clinical pharmacist service on drug related problems and patient outcomes for hospitalized patient with chronic kidney diseases: a randomized controlled trial, journal of clinical medicine, 2021 10(8):1788
- [5] Xiao feng ni et al., Drug-Related Problems of Patients in Primary Health Care Institutions: A Systematic Review, Front Pharmacol, 2021 Aug 17;12
- [6] Chen Q et al., Characteristics of drug-related problems among hospitalized ischemic stroke patients in China, International Journal of Clinical Pharmacy. 2020 Aug;42(4):1237-1241
- [7] Patricia Quintana-Bárcena et.al., Prevalence and Management of Drug-Related Problems in Chronic Kidney Disease Patients by Severity Level: A Sub analysis of a Cluster Randomized Controlled Trial in Community Pharmacies, journal of managed care and specialty pharmacy, 2018 ;24(2):173-181.
- [8] Lyne Lalonde et.al., Community Pharmacist Training-and-Communication Network and Drug-Related Problems in Patients With CKD: A Multicenter, Cluster-Randomized, Controlled Trial, American journal of kidney diseases, 2017;70(3):386-396
- [9] Aurelio Cabello-Muriel et.al., Effectiveness of pharmacist intervention in patients with chronic kidney disease, international journal of clinical pharmacy, 2014, 36(5):896-903
- [10] Salah M AbuRuz et al., Evaluation of the impact of pharmaceutical care service on hospitalized patients with chronic kidney disease in Jordan,

- international journal of clinical pharmacy, 2013 Oct;35(5):780-9
- [11] Stephanie Belaiche et al., Pharmaceutical care in chronic kidney disease: experience at Grenoble University Hospital from 2006 to 2010, *journal of nephrology*, 2012 Jul.;25(4):558-65
- [12] Nancy A Mason, Polypharmacy and medication-related complications in the chronic kidney disease patient, 2011 ;20(5):492-7
- [13] Teresa M.Salgado et.al., Pharmacists' interventions in the management of patients with chronic kidney disease: a systematic review, <https://doi.org/10.1093/ndt/gfr287>
- [14] Pehlivanli A et.al., Impact of a multidisciplinary approach involving clinical pharmacist on resolving drug related problems in chronic kidney patients: a prospective interventional study, *BMC Nephrol*, 2023;24(1):149.
- [15] Deepthi CD et.al., Role of Pharmacist Interventions in Drug Related Problem among Chronic Kidney Disease Patients. *Indian Journal of Pharmacy Practice*. 2022;15(3):210-217.
- [16] Khurshid Alam et.al., The prevalence and impact of clinical pharmacists' intervention on drug-related problems in patients with chronic kidney disease, *Cureus*, 2024;16(4)
- [17] Roheena Zafar et.al., Impact of pharmacist-led intervention for reducing drug-related problems and improving quality of life among chronic kidney disease patients: A randomized controlled trial, *PloS one*, 2025;20 (2).
- [18] Celine Mongaret et.al., The role of community pharmacists in the detection of clinically relevant drug-related problems in chronic kidney disease patients, *Pharmacy*, 2020;8(2).
- [19] Nancy A Mason, polypharmacy and medication-related complications in the chronic kidney disease patients, *current opinion in nephrology and hypertension*, 2011 sep;20(5):492-7.
- [20] Magdalena Jasinska-Stroschein, the effectiveness of pharmacist intervention in the management of patients with renal failure: A systematic review and Meta-Analysis, *International journal of environmental research and public health*, 2022 sep;19(18):11170
- [21] A Jeong Kim et.al., Pharmacist- Led Collaborative Medication Management for the Elderly with Chronic Kidney Disease and Polypharmacy, *International journal of environmental research and public health*, 2012 apr;18(8):4370
- [22] Nathan R Hill et.al., Global Prevalence Of Chronic Kidney Disease- A Systematic Review And Meta-Analysis, *PLoS One*, 2016 jul;11(7).
- [23] Aminu K Bello et.al., Complications of chronic kidney disease: current state, knowledge gaps and strategy for action, *Kidney International supplements*, 2011 oct;7(2):122-129.
- [24] Wendy L St Peter et.al., New models of chronic kidney patients care including pharmacist: improving medication reconciliation and medication management, *Current opinion in nephrology hypertension*, 2013 nov;22(6):656-62
- [25] Gunar Stemer et.al., Clinical pharmacy activities in chronic kidney disease and end stage renal disease patients: a systematic literature review, *BMC Nephrol*, 2011 jul;12(35).
- [26] Ramadaniati HU, Anggriani Yusi, Wowor VM, Rianti A. Drug-related problems in chronic kidneys disease patients in an Indonesian hospital: Do the problems really matter? *Int J Pharm Pharm Sci*. 2016;8(12):298-302
- [27] Whittaker CF, Miklich MA, Patel RS, Fink JC. Medication safety principles and practice in CKD. *Clin J Am Soc Nephrol*. 2018;13(11):1738-46.
- [28] Yang P, Chen N, Wang RR, Li L, Jiang SP. Inappropriateness of medication prescriptions about chronic kidney disease patients without dialysis therapy in a Chinese tertiary teaching hospital. *Ther Clin Risk Manag*. 2016;12:1517-24.
- [29] Mechta Nielsen T, Frøjk Juhl M, Feldt-Rasmussen B, Thomsen T. Adherence to medication in patients with chronic kidney disease: A systematic review of qualitative research. *Clin Kidney J*. 2018;11(4):513-27.
- [30] Al Raiisi F, Stewart D, Fernandez-Llimos F, Salgado TM, Mohamed MF, Cunningham S. Clinical pharmacy practice in the care of Chronic Kidney Disease patients: A systematic review. *Int J Clin Pharm*. 2019;41(3):630-66.