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ASSESSING THE IMPACT OF MEDICATION DEPRESCRIBING AND ITS OUTCOMES IN PATIENTS UNDERGOING HEMODIALYSIS – A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Introduction: Patients on hemodialysis are often privy to complex medication regimens due to their kidney failure and associated co-morbidities. As these individuals typically take multiple medications, they are at increased risk of adverse drug events, drug interactions, and medication related problems. Medication Deprescribing is a planned and supervised process of dose reduction or discontinuation of medications that may be inappropriate or no longer beneficial. However, its impact on hemodialysis patients remains in an area of active research and clinical interest.

Methods: A hospital-based, single-centered, observational study was conducted over six months at the Department of Nephrology, Pushpagiri Medical College Hospital, Thiruvalla. A total of 95 patients aged between 35-75 years with Chronic Kidney Disease and on hemodialysis were enrolled following ethical approval and informed consent. Data collection included the demographic profiles, baseline medication usage, clinical characteristics of the patients were recorded. Statistical analyses were performed using SPSS software, with significance at $p < 0.05$.

Results: The deprescription intervention led to significant medication changes among the 95 elderly

patients studied. 45.3% of patients had at least one medication stopped. Most commonly deprescribed drugs included proton pump inhibitors, multivitamins, and anti-hypertensive. The intervention also improved patient's understanding of their medications and fostered better communication with healthcare providers. Adverse events were minimal, and no serious adverse effects were reported.

Conclusion: Patients undergoing hemodialysis often face diminished quality of life due to co-morbidities, treatment complications, and psychological stress. The results of the present study indicated that Deprescription can be employed to improve medication adherence and quality of life in patients undergoing hemodialysis.

Keywords: Hemodialysis, Deprescribing, polypharmacy, Medication Adherence, Quality of Life, MARS

INTRODUCTION

Chronic Kidney Disease (CKD) is a progressive condition marked by the gradual loss of renal function over time, eventually requiring Renal Replacement Therapy (RRT) such as hemodialysis [1]. Globally, CKD affects approximately 850 million people and is among the fastest-growing causes of mortality [2]. India, especially the state of Kerala, is witnessing a surge in CKD prevalence due to high rates of diabetes mellitus, hypertension, and cardiovascular disease [3]. Patients undergoing hemodialysis often experience complex comorbidities and require extensive medication regimens to manage their health effectively [4]

Hemodialysis patients are vulnerable to polypharmacy—the concurrent use of multiple medications, typically five or more. In practice, these patients are prescribed an average of 10 to 15 medications daily to address complications associated with CKD,

including hypertension, diabetes, anemia, mineral and bone disorders, and cardiovascular conditions [5]. While necessary, such extensive pharmacotherapy increases the risk of adverse drug reactions (ADRs), drug-drug interactions, medication non-adherence, and overall diminished health-related quality of life (HRQoL). Commonly prescribed drug classes include phosphate binders, vitamin D analogues, antihypertensives, iron supplements, and various gastrointestinal and pain medications [6].

Several factors contribute to the growing concern around polypharmacy in this population. These include the presence of multiple comorbidities, dialysis-related complications, overlapping prescriptions from multiple specialists, and strict adherence to guideline-driven practices without patient-specific customization. Patients over 65 years

of age, with multiple disease conditions and frequent hospital visits, are particularly at risk. Polypharmacy can lead to an increased burden of managing complex regimens, reduced adherence, and higher healthcare costs [7].

Medication adherence is a significant challenge among hemodialysis patients. Factors such as cognitive impairment, depression, anxiety, limited health literacy, economic constraints, and lack of social support often interfere with optimal adherence. Additionally, poor communication between healthcare providers and patients can result in patients not understanding the importance of their medications or the potential risks associated with improper use. Non-adherence can result in deteriorating clinical conditions, increased hospitalizations, and higher mortality rates [8].

Health-Related Quality of Life (HRQoL) in hemodialysis patients is significantly impacted by physical symptoms (fatigue, cramps, hypotension), emotional distress (depression, anxiety), and treatment burden. Hemodialysis schedules restrict patient independence and interfere with daily activities, further reducing their perceived quality of life [9]. Instruments like the KDQOL and MARS scales are used to

evaluate HRQoL and adherence, respectively, and have shown that optimized medication management correlates positively with improved outcomes.

To address polypharmacy and its associated risks, medication deprescribing has emerged as an essential strategy. Deprescribing is a supervised process involving the dose reduction or discontinuation of medications that may be inappropriate, redundant, or no longer beneficial. In hemodialysis patients, deprescribing has the potential to reduce medication load, improve adherence, minimize ADRs, and enhance QoL. However, deprescribing is underutilized due to fear of clinical deterioration, insufficient training, lack of clear guidelines, and the complexity of patient profiles [10].

Despite its potential benefits, limited research exists on deprescribing among Indian hemodialysis patients. Most studies focus on developed healthcare systems, where resource availability, clinical infrastructure, and patient education are relatively advanced [11]. Given the unique socioeconomic and clinical challenges faced by Indian patients, context-specific evidence is needed to evaluate the feasibility and effectiveness of deprescribing interventions in improving clinical and quality-of-life outcomes [12].

This study aims to assess the impact of

medication deprescribing on adherence and HRQoL in patients undergoing hemodialysis at a tertiary care hospital in Kerala. The research also identifies the classes of drugs most commonly deprescribed and evaluates the clinical safety and acceptance of deprescribing as a therapeutic tool. The findings from this study are expected to provide valuable insights for integrating deprescribing into routine nephrology care and promoting rational pharmacotherapy in resource-limited settings [13].

MATERIALS AND METHODS

Study Design

A prospective, hospital-based observational study was conducted at the Department of Nephrology, Pushpagiri Medical College Hospital.

Study Population

All patients who received hemodialysis (35-70) years, Pushpagiri Medical College Hospital, Thiruvalla.

SAMPLE SIZE

The sample size obtained was $n=95$ using the formula; $N = Z\alpha^2PQ/d^2$

Inclusion criteria

- Patients who were taking all medications such as prescription drugs, over the counter medications (OTC) and supplements.
- Patients of either gender, aged 35 - 70.

Exclusion criteria

- Patients who were not willing to participate in the study.
- Patients with hearing, speech, or cognitive impairment that would hinder their ability to comprehend the study questionnaires.

STUDY PROCEDURE

This was a six month study that was conducted after getting approval from the Institutional Ethics Committee. All the subjects participating were given a brief introduction regarding the study and the confidentiality of data. A written informed consent was obtained from the subjects. Samples were recruited based on inclusion and exclusion criteria. A well-designed data collection form was used to collect the necessary information, such as demographic details of the patient. A deprescribing protocol was prepared after medication reconciliation and physician consultation and conferred with previous deprescribing studies. The deprescribing tool was then implemented to discover the potentially inappropriate medications. Following which, the medications were deprescribed. The patients medication adherence was measured using the MARS-10 scale and their quality of life using the HR-QOL questionnaire. The two values were analysed at baseline and

post-intervention to understand the effects of deprescription on these outcomes.

STATISTICAL ANALYSIS

Data collected was tabulated and statistically analysed using SPSS software

RESULTS AND DISCUSSION

1. DISTRIBUTION OF STUDY POPULATION BASED ON DEPRESCRIPTION

Deprescribing was implemented in 43 of 95 patients (45.3%), with most (93%) having one medication withdrawn. The median medication count reduced from 11 to 10 (IQR: 4), a statistically significant change ($p < 0.001$). This cautious, patient-centered approach led to a meaningful reduction in polypharmacy, aligning with findings from similar studies and supporting safer, more rational prescribing.

2. DISTRIBUTION OF DEPRESCRIBED MEDICINES AMONG THE STUDY POPULATION

Among the 43 patients who underwent deprescribing, the majority (93.0%) had only one medication withdrawn, while a smaller proportion (7.0%) had more than one drug deprescribed. This distribution reflects a cautious and individualized approach to deprescribing. This stepwise approach reflects cautious, patient-specific deprescribing practices, as similarly observed by *Falah et al.*, (2023).

3. CLASSIFICATIONS OF DRUGS BASED UPON APPROPRIATENESS AND INAPPROPRIATENESS

Medications commonly prescribed to patients undergoing hemodialysis were reviewed and classified based on appropriateness. The analysis revealed that a substantial proportion of these drugs were deemed appropriate for continued use. For instance, 97.9% of prescribed H2 receptor antagonists, 95.8% of phosphate-binding agents and vitamin supplements, 94.7% of uric acid-lowering agents, and 98.9% of both Oral Hypoglycemic agents and erythropoietin were found to be appropriate. The analysis revealed that, 17.9% sodium bicarbonate, 13.7% calcium supplements were found to be inappropriate followed by uric acid lowering agents, vitamin supplements, PPI's. H2A's, oral hypoglycemic and erythropoietin. These findings differ from those of *Gerardi et al.*, (2022), where allopurinol was the most commonly discontinued drug, possibly reflecting institutional prescribing patterns or regional differences in clinical practice.

4. CHANGE IN MEDICATION ADHERENCE POST DEPRESCRIPTION

Medication adherence was assessed using the Medication Adherence Rating Scale (MARS). The overall median MARS score at baseline was 9 (IQR: 3). Among the subgroup of

patients who underwent deprescribing, the median adherence score prior to intervention was 9 (IQR: 2), which improved to 10 (IQR: 1) after the deprescribing process. This improvement in adherence was statistically significant, as demonstrated by the Wilcoxon Signed Rank Test ($Z= 5.303$, $p < 0.001$). This trend aligns with findings by **Falah *et al.***, (2023), who also observed better adherence following deprescribing.

5. HEALTH RELATED QUALITY OF LIFE AMONG STUDY PARTICIPANTS AS ASSESSED BY HRQOL

Among the 43 patients who underwent deprescription, most domains of health-

related quality of life showed slight statistically significant change following the deprescription. General health rating remains largely stable with the slight shift towards better ratings. Similarly, the number of days with poor physical or mental health activity had differ after deprescription. However, there was a statistically significant reduction in the number of days patient reported not getting enough rest or sleep ($p= 0.036$). this trend aligns with findings by **Julia. Coloumbin *et al.***, (2021), who reported a negative association between polypharmacy and quality of life in dialysis patients.

Table 1: Distribution of study population based on deprescription

Deprescription	Frequency (n)	Percentage (%)
Done	43	45.3
Not Done	52	54.7
Total	95	100

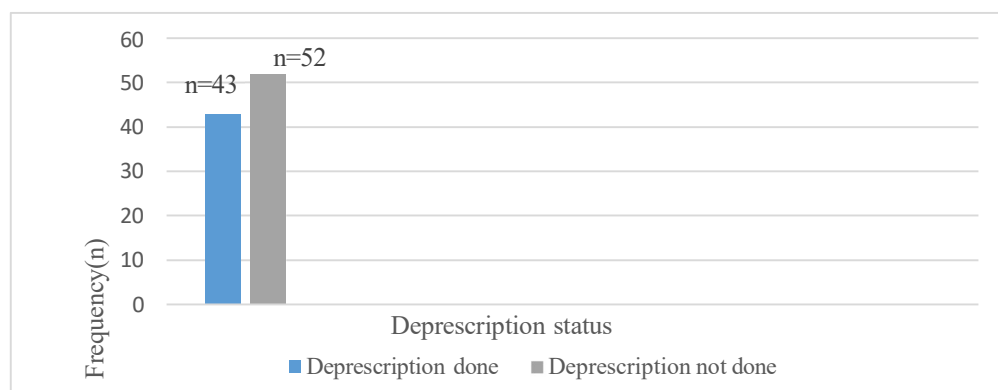


Figure 1: Distribution of study population based on deprescription

Table 2: Distribution of deprescribed medicines among the study population

No of drugs deprescribed	Frequency (n)	Percentage (%)
1	40	93.0
>1	3	7.0
Total	43	100

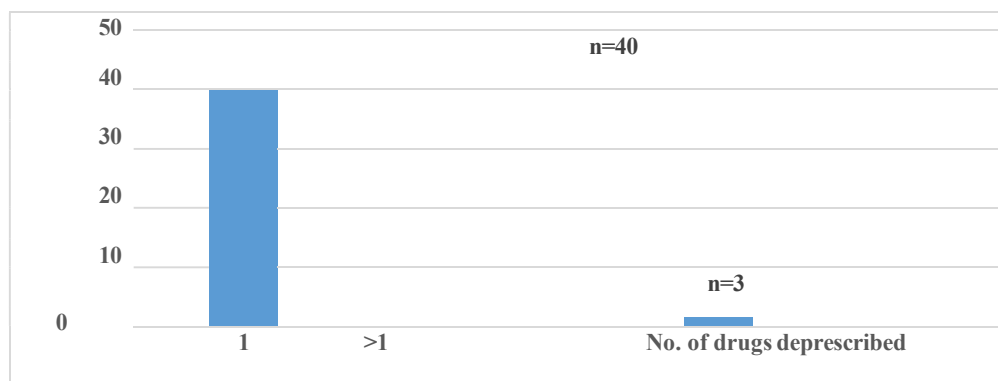


Figure 2: Distribution of study population based on no of drugs deprescribed

Table 3: Classification of drugs based upon Appropriateness and Inappropriateness

Drug Group	Inappropriate	Appropriate
Proton Pump Inhibitor	3(3.2%)	92(96.8%)
Calcium supplement	13(13.7%)	82(86.3%)
H2 receptor antagonists	2(2.1%)	93(97.9%)
Phosphate binding agents	4(4.2%)	91(95.8%)
Sodium Bicarbonate	17(17.9%)	78(82.1%)
Uric acid-lowering agents	5(5.3%)	90(94.7%)
Vitamin supplements	4(4.2%)	91(95.8%)
Oral Hypoglycemic agents	1(1.1%)	94(98.9%)
Erythropoietin	1(1.1%)	94(98.9%)

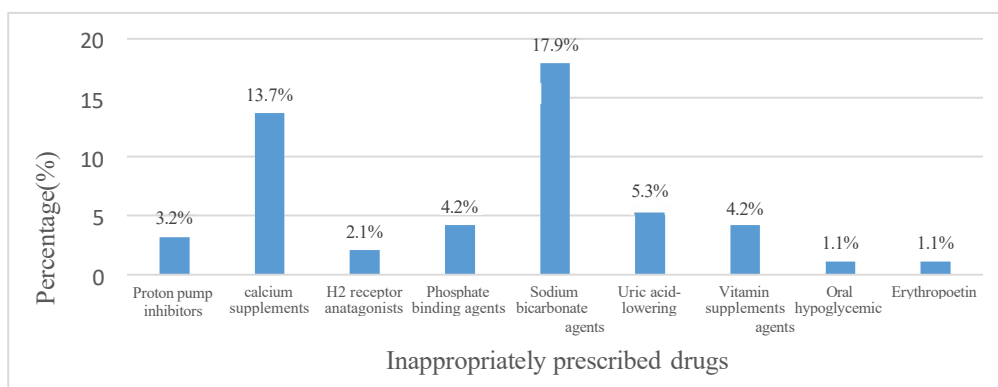


Figure 3(a): Distribution of the study population for whom the prescribed drugs are inappropriate

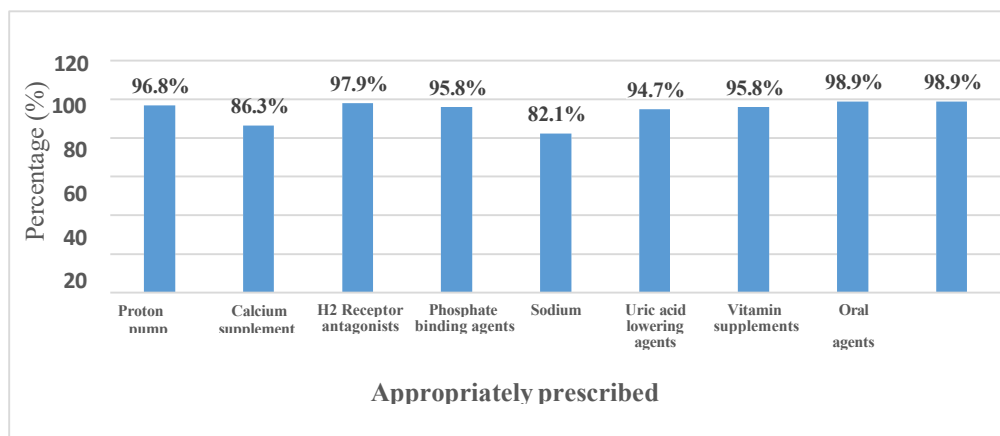


Figure 3(b): Distribution of study population for whom the prescribed drugs are appropriate

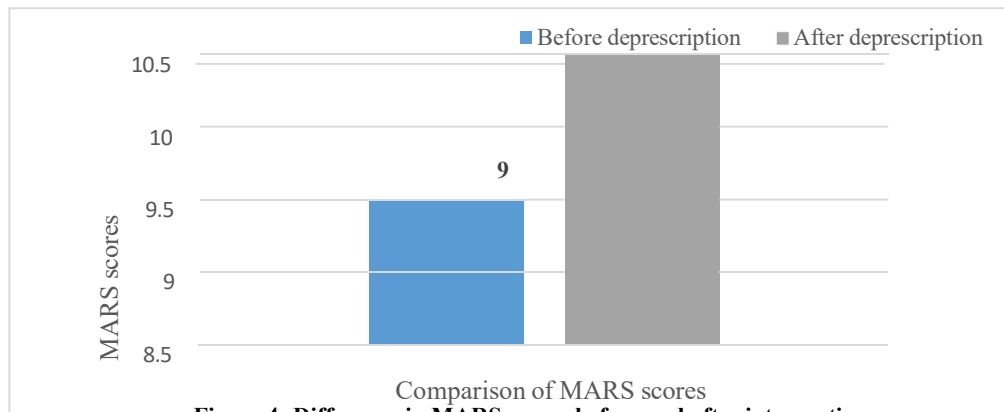


Figure 4: Difference in MARS scores before and after intervention

Table 4: Comparison of Health-related quality of life among study participants (n=43) before and after deprecation

Parameter		Before	After	Test statistic & P value
General health rating	Very Good-n(%)	1(2.3%)	3(7.0%)	Fishers exact test, p=0.850
	Good-n(%)	8(18.6%)	7(16.3%)	
	Fair-n(%)	29(67.4%)	29(67.4%)	
	Poor-n(%)	5(11.6%)	4(9.3%)	
Number of days physical health was not good in the past 30 days-median (IQR)		3(13)	3(10)	# Z =0.660, p=0.509
Number of days mental health was not good in the past 30 days-median (IQR)		0(6)	0(5)	# Z =0.170, p=0.865
Number of days poor physical or mental health limited usual activities in the past 30 days- median (IQR)		0(10)	0(6.5)	# Z =1.612, p=0.107
Limited in any activities due to impairment or health problem-n(%)		27(62.8%)	25(58.1%)	$\chi^2=0.195$, p=0.659
Need help with personal care due to impairment or health problem-n(%)		8(18.6%)	7(16.3%)	$\chi^2=0.081$, p=0.776
Need help with routine needs (e.g., chores, shopping) due to impairment		18(41.9%)	15(34.9%)	$\chi^2=0.443$, p= 0.506
Number of days pain interfered with usual activities in the past 30 days—median (IQR)		0(7)	0(9.5)	Z#=0.051, p=0.959
Number of days felt sad, blue, or depressed in the past 30 days—median (IQR)		0(0)	0(0)	Z#=1.697, p=0.08
Number of days did not get enough rest or sleep in the past 30 days-median(IQR)		4(10)	3(10)	Z#=2.096,p=0.036*
Number of days felt very healthy and full of energy in the past 30 days-median(IQR)		0(7)	0(20)	Z#=1.407,p=0.159
Number of days felt worried, tense, or anxious in the past 30 days-median(IQR)		0(0)	0(0)	Z#=1.625, p=0.104

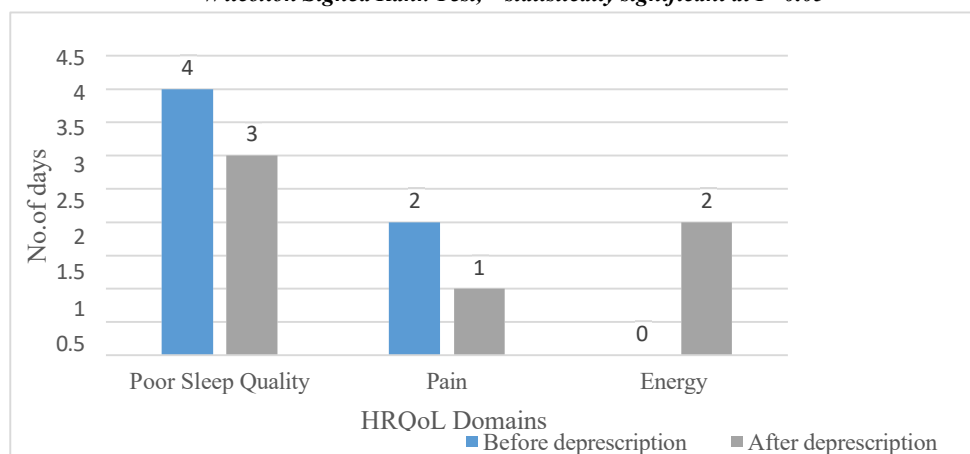
Wilcoxon Signed Rank Test, * statistically significant at $P<0.05$ 

Figure 5: Comparison of median number of days affected across selected health- related quality of life (HRQOL) domains before and after deprecating intervention

CONCLUSION

Patients undergoing hemodialysis often face diminished quality of life due to comorbidities, treatment complications and psychological stress. The results of the present study indicated that the deprescription can be employed to improve medication adherence and quality of life in patients undergoing hemodialysis. It also reduces the number of medications a patient takes from baseline. Thus, deprescription can be employed to stop, reduce, or replace potentially inappropriate drugs in hemodialysis patients.

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Conflict of interest

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Ethical consideration

Institutional research/ Human Ethics Committee approval was obtained.

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