Journal of the Postgraduate Institute of Medicine 2026; 13(1): E293 1-7

DOI: https://doi.org/10.4038/jpgim.v13i1.8626

Original Article

Changes in renal function and side-effect profile after conversion from Tacrolimus to Cyclosporine in kidney transplant recipients: A single-centre retrospective descriptive analysis

Sivakajani Balakumar[1], Chinthana Galahitiyawa[2], Chula Herath[2]

[1]Postgraduate Institute of Medicine, University of Colombo,[2] Sri Jayewardenepura General Hospital, Sri Lanka

Key words: Kidney transplantation, Tacrolimus, Cyclosporine, Calcineurin inhibitors, Renal function

Abstract

Background

Tacrolimus and cyclosporine are commonly used calcineurin inhibitors in kidney transplantation. In resource-limited settings, conversion between agents may occur due to drug availability, cost, or intolerance. Data on renal outcomes and adverse effects following conversion are limited in South Asia.

Methods

This retrospective descriptive analysis included adult kidney transplant recipients at a single Sri Lankan centre who were converted from tacrolimus to cyclosporine in 2023. Data collected included demographics, transplant characteristics, renal function [serum creatinine (mg/dl), eGFR], infections, and documented adverse effects. Renal function was assessed at baseline, 6 months, and 12 months post-conversion. Descriptive statistics were used: mean ± SD for continuous variables; percentages for categorical variables. Comparisons were descriptive due to the small sample size.

Results

Forty-four patients were included (mean age 49 years; 65.9% male). Most had received living donor transplants (79.5%) and had undergone transplantation more than two years prior to conversion. The most common reasons for conversion were tacrolimus unavailability, cost constraints, and drug intolerance. Mean serum creatinine and eGFR remained broadly stable over the 12-month follow-up period after conversion. Documented infections included COVID-19 infection, urinary tract infections, and other viral and bacterial respiratory tract infections. Gastrointestinal and cosmetic adverse effects were reported in a subset of patients; however, documentation of cosmetic adverse effects was incomplete in some clinical records.

Conclusion

In this single-centre retrospective analysis, conversion from tacrolimus to cyclosporine was associated with stable short-term renal function based on available records. These findings reflect real-world practice in a resource-limited setting but should be interpreted cautiously due to the descriptive design and limited sample size.

Corresponding Author: Sivakajani Balakumar, E-mail< sivakajni@gmail.com >

https://orcid.org/0000-0001-5546-4492

Received: 27 Jan 2026, Accepted: 13 Feb 2026, Published: 30 Mar 2026

Competing Interests: Authors have declared that no competing interests exist

Introduction

Kidney transplantation remains the preferred treatment for end-stage kidney disease, offering superior survival and quality of life compared with long-term dialysis [1]. Calcineurin inhibitors (CNIs), primarily tacrolimus and cyclosporine, form the cornerstone of maintenance immunosuppression in kidney transplant recipients [2].

Tacrolimus is generally favoured due to lower acute rejection rates; however, cyclosporine remains widely used, particularly in low- and middle-income countries, because of differences in cost, availability, and adverse-effect profiles [3,4]. In such settings, interruptions in drug supply and financial limitations may necessitate unplanned conversion between CNIs. Evidence describing renal function and adverse outcomes following conversion in real-world clinical practice is limited, particularly from South Asia. This study describes renal function outcomes, infections, and documented adverse effects among kidney transplant recipients who were converted from tacrolimus to cyclosporine at a single tertiary centre in Sri Lanka.

Objectives

1. To describe renal function over 12 months following conversion from tacrolimus to cyclosporine in kidney transplant recipients.
2. To describe infections and documented adverse effects following conversion based on available clinical records.

Methods

This was a retrospective, descriptive, single-centre study conducted at the Renal Transplant Clinic, Sri Jayewardenepura General Hospital, Sri Lanka. Adult kidney transplant recipients (>18 years) who were converted from tacrolimus to cyclosporine during 2023 were eligible.

Data were extracted from clinic records and laboratory reports. Patient interviews were used only to clarify medication history when documentation was incomplete. Variables collected included age, sex, donor type, time since transplantation, immunosuppressive regimen, serum creatinine, eGFR, documented infections (including cytomegalovirus and BK virus), and adverse effects recorded during routine clinic visits.

Patients with incomplete or missing essential medical records were excluded; four patients were excluded for this reason, leaving 44 patients for analysis. Among these, 3 patients (6.8%) did not receive tacrolimus, and 2 patients (4.5%) did not receive cyclosporine This was likely attributable to factors such as contraindications, and clinician-directed adjustments to immunosuppressive therapy, based on patient-specific clinical conditions.

Renal function was assessed using serum creatinine (mg/dL) and eGFR values recorded at baseline (time of conversion), six months, and 12 months. Adverse effects were

recorded only if documented in clinic notes; absence of documentation was not assumed to indicate absence of symptoms.

Results

Patient characteristics and transplant details

The cohort comprised 44 renal transplant recipients with a mean age of 49.0 ± 14.3 years, of whom 65.9% were male.

Table 1. Baseline demographic characteristics of the study population

Characteristic	Tacrolimus	Cyclosporine	P value
Age (years), mean ± SD	49.46 ± 14.57	50.24 ± 14.15	0.727
Male sex, n (%)	28 (68.3)	27 (64.3)	0.540
Female sex, n (%)	13 (31.7)	15 (35.7)	—
Body weight (kg), mean ± SD	67.55 ± 14.27	68.12 ± 13.98	0.812

SD, standard deviation.

Most patients received kidneys from living donors (n=36, 79.5%), while 20.5% underwent deceased donor kidney transplantation. The mean duration since transplantation was 3.86 ± 3.88 years; 77.3% of patients were more than two years post-transplant, while 22.7% were within two years of transplantation.

Table 2. Transplant characteristics and concomitant immunosuppression

Variable	Tacrolimus	Cyclosporine	P value
Time since transplant > 2 years, n (%)	31 (75.6)	31 (75.6)	1.000
Time since transplant ≤ 2 years, n (%)	10 (24.4)	10 (24.4)	—
Living donor transplant, n (%)	33 (80.5)	33 (78.6)	1.000
Deceased donor transplant, n (%)	8 (19.5)	9 (21.4)	—
Mycophenolate mofetil use, n (%)	39 (95.1)	40 (95.2)	0.059
Prednisolone use, n (%)	39 (95.1)	41 (97.6)	0.120
HLA mismatch ≥ 3, n (%)	15 (71.4)	15 (71.4)	1.000
HLA mismatch < 3, n (%)	6 (28.6)	6 (28.6)	—

HLA, human leukocyte antigen.

Human leukocyte antigen (HLA) mismatches were present in 71.4% of recipients, whereas 28.6% had favourable HLA matching with fewer than three mismatches. Antibody-mediated rejection was observed in only one patient (2.3%) and was successfully managed with plasmapheresis.

Tacrolimus was administered to 93.2% of patients, while 95.5% received cyclosporine during the study period. All participants continued mycophenolate mofetil (MMF) and prednisolone as part of a triple immunosuppressive regimen. Conversion from tacrolimus to cyclosporine occurred in 56.8% of patients, primarily due to tacrolimus unavailability and cost constraints, as well as tacrolimus intolerance. Among those converted, intolerance accounted for 65.2% of cases, with adverse effects contributing to 8.6%.

Hypertension was the leading cause for the end stage kidney failure (52.3%), followed by diabetes mellitus (31.8%). Glomerular nephritis and CINAC (chronic interstitial nephritis in agricultural communities) each accounted for 6.8%, while other unknown causes contributed 2.6% of cases.

Reasons for Conversion

The most common reasons for conversion were tacrolimus unavailability, cost constraints, and documented intolerance. Conversion was not protocol-driven and reflected routine clinical practice.

Renal Function

Mean serum creatinine levels over 12 months for tacrolimus users were: baseline 1.48 ± 1.28 µmol/L, 6 months 1.56 ± 0.83 µmol/L, and 12 months 1.67 ± 1.00 µmol/L . Cyclosporine users had comparable levels: baseline 1.49 ± 1.31 µmol/L, 6 months 1.58 ± 0.85 µmol/L, and 12 months 1.70 ± 1.03 µmol/L, with no significant differences between groups at any time point.

Table 3. Renal function and rejection outcomes over 12 months

Outcome	Tacrolimus	Cyclosporine	P value
Antibody-mediated rejection, n (%)	1 (2.4)	1 (2.4)	1.000
Serum creatinine (mg/dL), baseline	1.51 ± 1.32	1.49 ± 1.31	0.714
Serum creatinine (mg/dL), 6 months	1.57 ± 0.85	1.58 ± 0.85	0.819
Serum creatinine (mg/dL), 12 months	1.68 ± 1.03	1.70 ± 1.03	0.671

Values expressed as mean ± SD.

Infections

Overall, 43.2% of participants experienced infections, while 56.8% did not. Among infections, COVID-19 was the most frequent (42.1%), followed by lower urinary tract infections (21.1%), fever (15.8%), lower respiratory tract infections (10.5%), and upper respiratory tract infections (10.5%). CMV viremia was observed in 28.6%, while 57.1% tested negative; one participant had syndrome, and another one had CMV colitis and received treatment dosage of valganciclovir. The mean duration to CMV diagnosis was 2.9 ± 1.97 years. BKV positivity was 20.0%, with a mean diagnosis time of 1.29 ± 1.26 years.

Table 4. Infection profile and inflammatory markers

Variable	Tacrolimus	Cyclosporine	P value
CMV positivity, n (%)	3 (25.0)	3 (23.1)	1.000
BK virus positivity, n (%)	2 (20.0)	2 (20.0)	1.000
Any infection, n (%)	17 (41.5)	19 (45.2)	0.570
COVID-19 infection, n (%)	8 (47.1)	8 (42.1)	1.000
Urinary tract infection, n (%)	4 (23.5)	4 (21.1)	1.000
CRP > 5 mg/L, n (%)	6 (75.0)	7 (77.8)	1.000

CMV, cytomegalovirus; CRP, C-reactive protein.

Adverse Effects

Table 5. Adverse effect profile

Adverse effect	**Tacrolimus**	**Cyclosporine**	**P value**
Gastrointestinal symptoms, n (%)	9 (22.0)	9 (21.4)	1.000
Cosmetic effects, n (%)	16 (39.0)	17 (40.5)	1.000
Peripheral numbness, n (%)	3 (7.3)	3 (7.1)	1.000

Tacrolimus was associated with gastrointestinal symptoms, including bloating (18.9%) and gastritis (12.5%), while cyclosporine more commonly caused hypertrichosis (7.8%) and pruritus (5.2%). Cardiovascular adverse effects were not significantly different between the two groups, and hyperkalaemia prevalence was similar (~5%), suggesting comparable risk profiles. Literature reports, however, indicate a higher incidence of dyslipidaemia, hypertension, and post-transplant weight gain with cyclosporine, as well as more severe infections, malignancies, and cosmetic effects, whereas tacrolimus is more often linked to new-onset diabetes after transplant (NODAT)

Table 6. Metabolic and renal outcomes

Outcome	Tacrolimus	Cyclosporine	P value
Proteinuria, n (%)	6 (14.6)	6 (14.3)	1.000
Hyperkalaemia, n (%)	2 (4.9)	2 (5.0)	1.000
New-onset diabetes after transplant, n (%)	1 (2.4)	1 (2.4)	1.000
Blood pressure controlled (<140/90 mmHg), n (%)	38 (92.7)	39 (92.9)	1.000

Discussion

In this single-centre retrospective study, renal function remained stable over one year following conversion from tacrolimus to cyclosporine in kidney transplant recipients. These findings are consistent with previous observational studies suggesting that short-term renal outcomes may remain stable following calcineurin inhibitor conversion when clinically indicated CNI conversion [5–7].

The study reflects real-world practice in a resource-limited setting, where medication availability and cost significantly influence immunosuppressive management. Adverse effects and infections were documented based on routine clinical records rather than systematic assessment, limiting the ability to estimate true incidence.

The descriptive design, small sample size, and retrospective data collection limit generalisability. The absence of systematic adverse-effect assessment means under-reporting is likely.

Limitations: This study is limited by its retrospective design, small sample size, and single-centre setting. Data were derived primarily from routine clinical records, resulting in incomplete documentation of adverse effects and infections. The non-systematic

selection of patients and lack of protocolised follow-up limit causal interpretation and generalisability.

Conclusion

In this retrospective single-centre cohort, conversion from tacrolimus to cyclosporine was associated with stable short-term renal function based on available clinical records. These findings provide descriptive insight into real-world immunosuppressive practice in a resource-limited setting but should be interpreted cautiously. Further prospective studies with systematic data collection are required.

Abbreviations

CNI-Calcineurin inhibitor; eGFR- estimated glomerular filtration rate; MMF-Mycophenolate mofetil; CMV-cytomegalovirus; BKV-BK virus; UTI-Urinary tract infection; CINAC- Chronic interstitial nephritis in agricultural communities; NODAT- New-onset diabetes after transplant

Ethics approval and consent to participate: Approved by the Ethics Review Committee, Sri Jayewardenepura General Hospital. Informed consent waived due to retrospective design.

Availability of data and materials: Available from corresponding author upon request.

Acknowledgements: The authors thank the Ethics Review Committee of the Sri Jayewardenepura General Hospital, Sri Lanka for granting permission to conduct this study and the staff of the Renal Department for their support in data collection.

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