MJMR, Vol. 35, No. 4, 2024, pages (160-166).

Open Access
ISSN:2682-4558

Research Article

The effects of mycophenolate mofetil and mycophenolate sodium on kidney transplant recipients at the University Hospital for Nephrology and Urology in Minia, Egypt

Osama El-Minshawy[1], Hisham Mostafa[1], Mohammed Talaat[1] and Basma Fathy[1]
[1] Department of Internal Medicine and Nephrology, Faculty of Medicine, Minia University

DOI: 10.21608/MJMR.2024.265887.1650

Abstract
Aim: The purpose of this research is to examine tacrolimus-based renal transplant patients and compare MMF with MPS. **Patients and Methods:** Three hundred patients will be enrolled in this case-control research from Minia University Hospital's outpatient clinic. There are two categories of subjects: **Group I:** Fifty-five individuals undergoing a renal transplant on MPS. **Group II:** Fifty-five patients undergoing renal transplantation on MFF. **Results**: The p-value (<0.001) indicates that there is a statistically significant difference in BMI and dose between the two groups twice. The p value (<0.001) indicates that there is a statistically significant difference between the two groups in terms of S.Cr and a/c ratio. **In conclusion,** there was no statistically significant difference in the safety or effectiveness of MMF and MPS. Compared to maintenance MMF dosages, MPS doses were greater. It is possible that immunosuppression will be improved with these greater dosages. There was no discernible difference in the two regimens' efficacies, nevertheless, according to our research. When deciding on a mycophenolic acid derivative, cost should be a major factor.

Key words: Major medical factors; less invasive kidney surgery;

Introduction
Peptic ulcer disease is a frequent side effect of KTx that may cause serious health problems or even death. (1) To treat or prevent difficulties over the long term, proton pump inhibitors (PPIs) are added (2). The impact of the interaction on the active blood levels of the medicine is debatable, however drug-drug interactions (DDIs) can occur when MMF or EC-MPS are used with PPIs. Hence, patients treated with mycophenolate in conjunction with proton pump inhibitors should be closely monitored, according to DDI checkers supplied by drug databases. (3).

Researchers have looked at how PPIs interact with other drugs, but they haven't compared their findings on how this affects long-term clinical outcomes such graft loss, graft survival, or death. Few participants and short study durations characterize the present state of pharmacological impact comparison research (4.

Aim of the work
In order to investigate the relative merits of tacrolimus-based MMF and MPS in patients undergoing renal transplantation

Patients and Methods
The participants in this case-control research had 300 Minia University Hospital's outpatient clinic will be used to recruit patients.
Two categories of subjects are formed:
Group I: Fifty-five patients undergoing a renal transplant on MPS
Group II: Fifty-five patients undergoing renal transplantation on MFF

We compared between 2 groups:
1- The rate of rejection in both groups
2- GIT symptoms in both groups

Here is what every patient may expect:
1- Complete patient history
2- Reason for carrying a donor kidney

3-Gastrointestinal issues after kidney transplant
4- Regular laboratory tests, such as complete blood count (CBC), uric acid, renal function, urine analysis, calcium, and phosphorus

Statistical Analysis
Descriptive analysis was used to assess the features and results of the patients. For nominal categorical values expressed as percentages, the chi-square test was used, while for non-parametric continuous variables, the Mann-Whitney U test was employed, with median and interquartile range being the corresponding descriptions (IQR).

Table 1: Demographic data between the two groups

		Group I	Group II	P value
		N=150	N=150	
Age	*Range* *Mean ± SD*	(10-68) 33.2±13.8	(10-62) 31.3±11.9	*0.207*
Sex	*Male* *Female*	100(66.7%) 50(33.3%)	91(60.7%) 59(39.3%)	*0.280*
BMI	*Range* *Mean ± SD*	(11-26) 21.7±2.6	(11-26) 19.8±4.2	***<0.001****
Special habits	*None* *Smoking*	147(98%) 3(2%)	144(96%) 6(4%)	*0.310*
ESRD AE	*Unknown* *DM* *GN* *PCK* *HTN* *SLE*	51(34%) 17(11.3%) 32(21.3%) 18(12%) 32(21.3%) 0(0%)	45(30%) 17(11.3%) 34(22.7%) 18(12%) 35(23.3%) 1(0.7%)	*0.905*
Donor type	*LRD* *LURD*	47(31.3%) 103(68.7%)	47(31.3%) 103(68.7%)	*1*
Time of Tx	*Range* *Mean ± SD*	(1-15) 4.6±2.8	(1-15) 4.7±2.7	*0.725*
Dose (twice)	*Range* *Mean ± SD*	(360-720) 669.6±125.3	(1000-1000) 1000±0	***<0.001****

The two groups vary significantly in BMI and dose (twice) according to table (1), with a p value of less than 0.001.
For all other demographic variables, there was no statistically significant difference between the two sets of data.

Table 2: Laboratory data between the two groups

		Group I N=150	Group II N=150	P value
Tacrolism level	Range Mean ± SD	(4.2-9.9) 7.3±1.5	(4-9.7) 7.1±1.4	*0.251*
Urea	Range Mean ± SD	(12-44) 29.5±7.4	(11.5-43.9) 29 ±7.5	*0.561*
S. cr	Range Mean ± SD	(0.4-2.1) 1.3±0.4	(0.1-0.4) 0.3±0.1	***<0.001****
CBC	Range Mean ± SD	(9.5-14.6) 12.3±1.2	(9.5-14.5) 12.3±1.3	*0.792*
PTH	Range Mean ± SD	(70-96) 81.2±8.1	(70-96) 80.2±8.2	*0.273*
a/c ratio	Range Mean ± SD	(30-99) 58±21.2	(7-29) 16.4±8.3	***<0.001****
eGFR	Range Mean ± SD	(80-90) 85.1±3.1	(79-89) 84.5±3.1	*0.112*

With respect to table (2), the p value (<0.001) indicates that there is a statistically significant difference between the two groups in terms of S.Cr and a/c ratio.
Regarding the other laboratory measures, no statistically significant difference was found between the two groups.

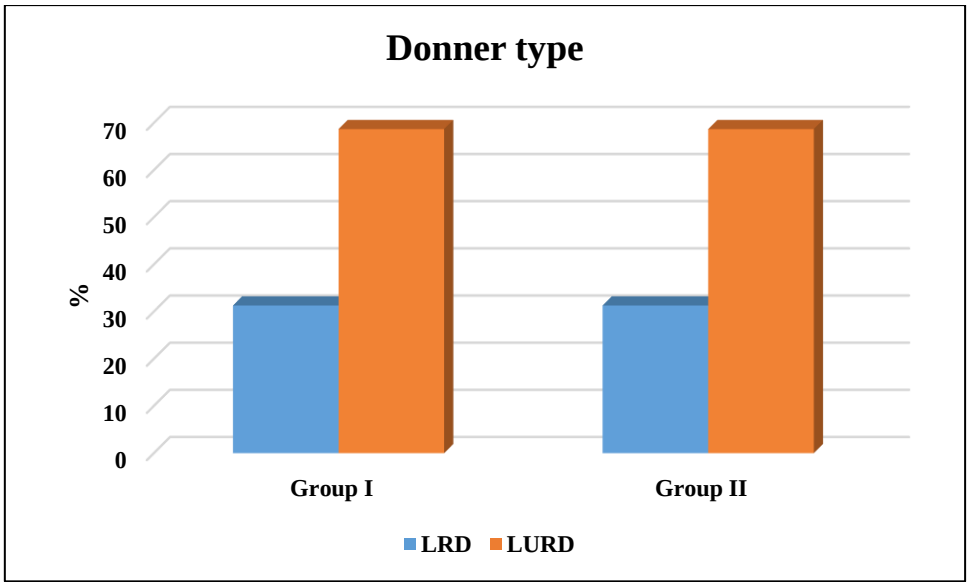

Fig. (1): Comparison donner type in two groups

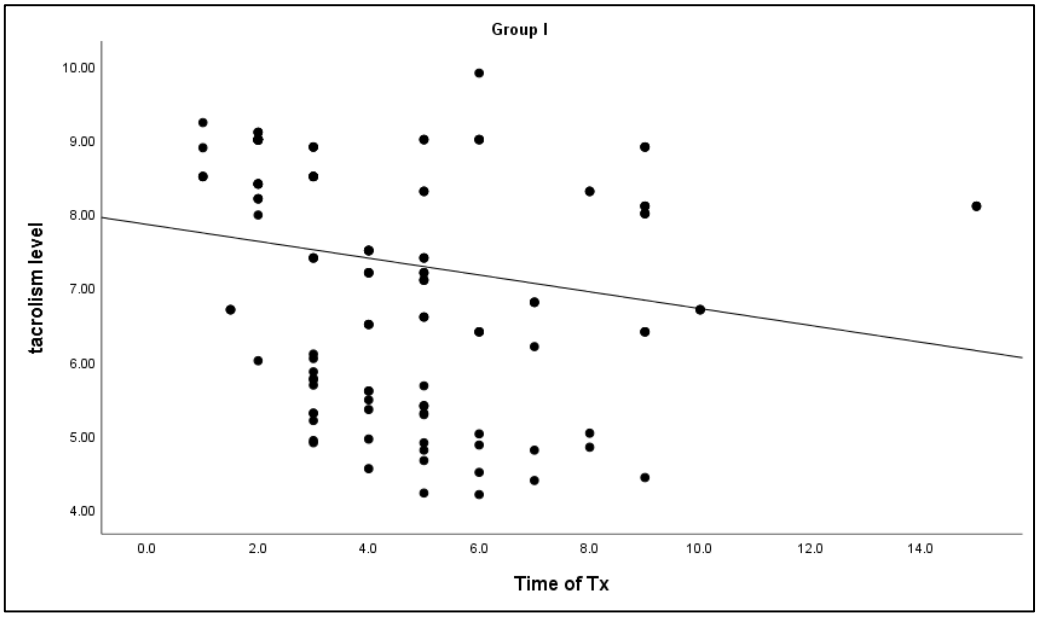

Fig. (2): Correlation between tacrolism level and time of Tx in group

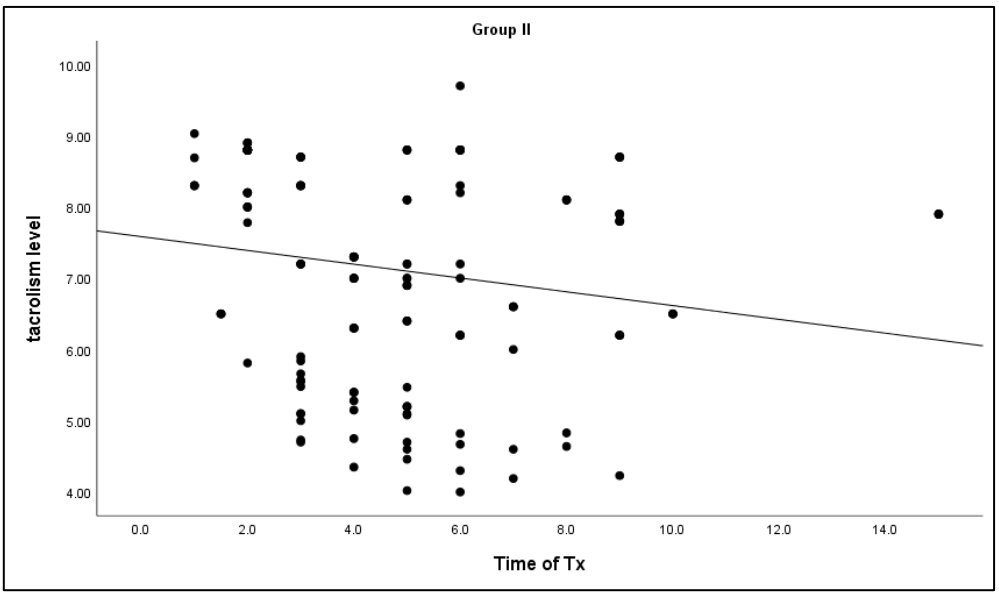

Fig. (3): Correlation between tacrolism level and time of Tx in group II

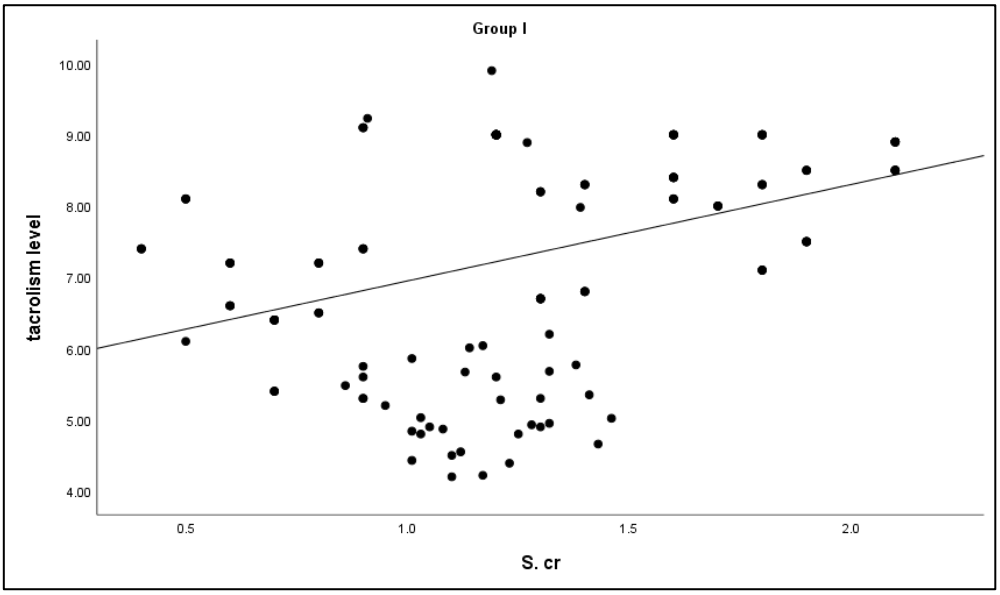

Fig. (4): Correlation between tacrolism level and S.Cr in group I

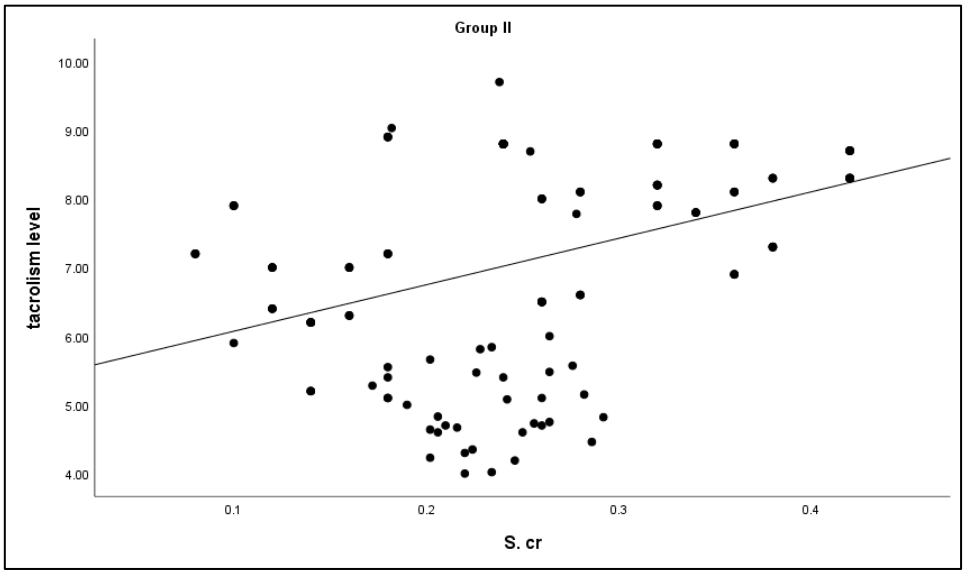

Fig. (5): Correlation between tacrolism level and S. Cr in group II

Discussion

Here are the findings:

The two groups vary significantly in terms of body mass index (BMI) and dosage (twice), with a p value of less than 0.001.

For all other demographic variables, there was no statistically significant difference between the two sets of data.

The p value (<0.001) indicates that there is a statistically significant difference between the two groups in terms of S.Cr and a/c ratio.

Other laboratory measurements did not show a statistically significant difference between the two groups.

Other clinical data factors did not show a statistically significant difference between the two groups.

The most common side effects of mycophenolic acid derivatives are gastrointestinal problems (particularly diarrhoea) and leukopenia.

Recent research on heart transplant recipients found that gastrointestinal side effects were just as common in patients on MMF (61.6 percent) as they were in those taking MPS (69.2 percent) after 12 months. Among kidney transplant recipients, gastrointestinal side symptoms were reported by 33.3% of MMF patients and 32.4% of MPS patients. Similar gastrointestinal side effects are produced by intravenous and oral administration of MMF. Thus, it has been proposed that the onset of gastrointestinal adverse effects associated with mycophenolic acid derivatives does not occur during gastrointestinal consumption but rather starts thereafter. [5-9]

So far, only the MMF to MPS conversion has been carried out among mycophenolic acid derivatives. It is likely that the development of MPS suggested it as a medication with less gastrointestinal side effects, which is why it is used in this fashion in clinical practice—a one-way conversion. This claim was borne up by preliminary research. [10]

As previously stated, further research has shown that individuals whose treatment plans were changed from MMF to MPS do better clinically. Though only a tiny percentage of well-designed trials with control groups have shown conclusive evidence of the efficacy of numerous one-way conversion trials in medicine. There was no discernible difference in effectiveness between the two groups. Prior research on this topic has yielded contradictory conclusions. [11-15]

In conclusion, there was no statistically significant difference in the safety or effectiveness of MMF and MPS. Compared to maintenance MMF dosages, MPS doses were greater. It is possible that immunosuppression will be improved with these greater dosages. There was no discernible difference in the two regimens' efficacies, nevertheless, according to our research. When deciding on a mycophenolic acid derivative, cost should be a major factor.

References

1. CellCept® [package insert]. Nutley, NJ: Roche Laboratories Inc; May 2008.
2. Myfortic® [package insert]. East Hanover, NJ: Novartis Pharmaceuticals Corporation; May 2008.
3. JohnstonA, He X, Holt DW. Bioequivalence of enteric-coated mycophenolate sodium and mycophenolate mofetil: a meta-analysis of three studies in stable renal transplant recipients. Transplantation. 2006;82: 1413–8.
4. Nowak I, Shaw LM. Mycophenolic acid binding to human serum albumin: characterization and relation to pharmacodynamics. Clin Chem. 1995 Jul; 41(7):1011–7.
5. Staatz CE, Tett SE. Clinical pharmacokinetics and pharmacodynamics of mycophenolate in solid organ transplant recipients. Clin Pharmacokinet. 2007;46 (1):13–58.
6. Naesens M, de Loor H, Vanrenterghem Y, Kuypers DR. The impact of renal allograft function on exposure and elimination of mycophenolic acid (MPA) and its metabolite MPA 7-O-glucuronide. Transplantation. 2007 Aug 15;84(3):362–73.
7. Van Gelder T, Hilbrands LB, Vanrenterghem Y, et al., A randomized double-blind, multicenter plasma concentration controlled study of the safety and efficacy of oral mycophenolate mofetil for the prevention of acute rejection after kidney transplantation. Transplantation. 1999;68:261.
8. Kuypers, DR, Claes K, Evenepoel P, et al., Clinical efficacy and toxicity profile of tacrolimus and mycophenolic acid in relation to combined long- term pharmacokinetics in de novo renal allograft recipients. Clin Pharmacol Ther. 2004; 75:434.
9. Mourad M, Malaise J, Chaib Eddour D, et al., Pharmacokinetics basis for the efficient and safe use of low-dose mycophenolate mofetil in combination with tacrolimus n kidney transplantation. Clin Chem. 2001; 47:1241.
10. Le Meur Y, Büchler M, ThierryA, et al., Individualized mycophenolate mofetil dosing based on drug exposure significantly improves patient outcomes after renal transplantation. Am J Trans plant. 2007 Nov;7(11):2496–503. Epub 2007 Oct 1.
11. Gaston RS, Kaplan B, Shah T, et al., Fixed- or Controlled-Dose Mycophenolate Mofetil with Standard- or Reduced-Dose

Calcineurin Inhibitors: The Opticept Trial. Am J Transplant. 2009 May 20. [Epub aheadof print].
12. Budde K, Tedesco-Silva H, Pestana JM, et al., Enteric coated mycophenolate sodium provides higher mycophenolic acid predose levels compared with myco pholate mofetil: implications for therapeutic drug monitoring. Ther Drug Monit. 2007; 29:381–4.
13. Cattaneo D, Cortinovis M, Baldelli S, et al., Pharmacokinetics of mycophenolate sodium and comparison with the mofetil formulation in stable kidney transplant recipients. Clin J Am Soc Nephrol. 2007; 2:1147–55.
14. Budde K, Tedesco-Silva H, Pestana JM, et al., Enteric-coated mycophenolate sodium provides higher mycophenolic acid predose levels compared with mycoph enolate mofetil: implications for therapeutic drug monitoring. Ther Drug Monit. 2007 Jun;29(3):381–4.
15. van Gelder T, Klupp J, Barten MJ, Christians U, Morris RE: Comparison of the effects of tacrolimus and cyclosporine on the pharmacokinetics of mycophenolic acid. Ther Drug Monit. 2001;23(2):119–28.