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ORIGINAL ARTICLE

Experience of rituximab use in treating glomerular disease in central South Africa

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ABSTRACT

Background: Most guidelines recommend rituximab for the treatment of various glomerular diseases. However, the high cost deters its use in resource-limited countries. This study investigated rituximab as treatment for glomerular diseases and whether this relatively expensive medication is justifiable in a resource-constrained setting.
Methods: This retrospective cross-sectional study was conducted at the Universitas Academic Hospital Nephrology Clinic in the Free State province of South Africa. Demographic, clinical, and laboratory information was obtained from the medical records of patients treated with rituximab from January 2016 to December 2023. The indications for rituximab treatment, number of doses, estimated cost, adverse events and patient outcomes were documented.
Results: Seventeen patients were treated with rituximab during the study period. Most patients (n = 11; 65%) were female. Their median age was 25 years (interquartile range 20–28 years), and 88% were Black. The most common histological diagnoses were membranous nephropathy (n = 7; 41%), of which 86% were anti-PLAR2 antibody-positive, and lupus nephritis (n = 5; 29%). The indication for rituximab was mostly failed previous immunosuppression therapy (n = 12; 71%). Only one patient had an infusion-related reaction. A complete or partial response was recorded in 10 (59%) patients. Kidney function deteriorated in one patient, and another died. The median cost of RTX treatment was ZAR 42 700.
Conclusion: Approximately 60% of the patients achieved a complete or partial response, indicating that rituximab may be an effective therapy. The cost to treat one patient was high, although counteracted by the relative safety reflected by the few adverse outcomes recorded.

Keywords: glomerular disease; B cell; nephrotic syndrome; complete response; partial response; rituximab.

INTRODUCTION

Glomerular disease (GD) refers to heterogeneous conditions with inflammatory and non-inflammatory pathogenesis resulting in glomerular damage, the hallmark of which is albuminuria [1]. The clinical presentation of GD is diverse, ranging from asymptomatic urinary findings such as microhaematuria and proteinuria to nephritic syndrome, nephrotic syndrome, or rapidly progressive glomerulonephritis (RPGN) [2]. GD is the third-leading cause of chronic kidney disease (CKD) globally [3]. Understanding the various pathogenic mechanisms of GD has led to the discovery of different therapeutic agents, many of which are involved in quenching the inflammatory processes, resulting in reduced glomerular damage [4].

Rituximab (RTX) is a chimeric murine (mouse)-derived monoclonal antibody of the immunoglobulin G1 subclass [5]. This biological agent received its first Food and Drug Administration (FDA) approval for the treatment of B-cell clonal lymphoproliferative conditions in 1997. In 2006, it was FDA-approved for the treatment of rheumatoid arthritis. The mechanism of action involves targeting B lymphocytes with the cluster differentiation 20 (CD20) marker on their surface. CD20 is expressed on immature, mature, and activated B cells but is lost

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when these cells differentiate to form plasma and memory cells, making RTX ineffective [6]. Proteasome inhibitors such as bortezomib become the preferred targets once the CD20 marker is lost due to differentiation. However, lack of evidence in randomised controlled trials (RCTs) for proteosome inhibitors in most GD suggests that RTX should be introduced early in treating immune-mediated GD to obtain an adequate response [7].

There has been an increased understanding of the role of the immune process in the pathogenesis of most glomerular diseases. B-cell lymphocytes play a central role and are an effective target in the therapeutic processes. This has brought RTX to the fore in the treatment of GD. Kidney Disease Improving Global Outcomes (KDIGO) guidelines recommend using RTX as an induction or maintenance therapy, or both, in various GDs based on the results of randomised clinical trials [8]. For example, almost 60% of primary membranous nephropathy (MN) patients treated with RTX are reported to achieve partial or complete remission [9]. The LUNAR trial showed RTX as an excellent therapy for proliferative lupus nephritis (LN) [10]. This finding was confirmed by the BLISS trial, which demonstrated a synergistic effect when RTX is used in combination with belimumab [11].

Although the recommendations in clinical guidelines are based on well-controlled studies, uncertainty remains about the optimal dosing regimen for rituximab. Most trials involving adult patients administered 1 g on day 0, followed by either 1 g, or 375 mg/m^2, on day 14. A second cycle can be repeated after six months [5]. Clinical response biomarkers, such as anti-phospholipase A2 receptor (anti-PLA2R) levels in primary MN and CD19 levels, can be used to determine subsequent dosing [10].

A limited number of real-world case reports and studies on the use of RTX to treat GD have been published. The high cost of RTX hampers its use in resource-restricted settings [12]. The adverse effects of RTX are infusion-related reactions (IRR), hypogammaglobulinaemia, reactivation of latent infections such as hepatitis B virus (HBV) and tuberculosis (TB), and transmission of the John Cunningham (JC) virus that causes progressive multifocal leukoencephalopathy (PML) [13,14]. For patients who experience anaphylactic reactions, RTX is terminated. If anti-CD20 therapy remains the preferred treatment, a fully humanised biological agent, such as obinutuzumab [15], can be used. Protocols are available to monitor and administer intravenous immunoglobulin when levels are critically low, specifically when IgG falls below 4 g/L.

Hypogammaglobulinaemia is worse in patients treated with bone marrow suppressants such as cyclophosphamide and in those on high-dose steroids. This can result in fatal infections and vaccine hyporesponsiveness. For patients with human immunodeficiency virus (HIV) infection, prescription of RTX may be limited due to fear of worsening immune suppression and the lack of studies undertaken in HIV-positive patients [16].

The centre where our study was conducted has limited access to RTX, although its use may be approved through a special motivation process, where it can be prescribed only if all other possible immunomodulating strategies have either failed or are deemed to be associated with unacceptable risk. Glucocorticoids (GC), calcineurin inhibitors (CNI), cyclophosphamide (CYP), mycophenolate mofetil (MMF), and azathioprine are typically used for most cases of immune-mediated GD. Nevertheless, they may yield poor responses or intolerance due to side effects precluding their use.

The aim of the study reported here was to outline the demographic and clinical features of patients with GD treated at our tertiary hospital in South Africa, and determine reasons for treatment, outcomes and any adverse effects of RTX in these patients. The results of this study can be used to justify whether resource-constrained centres can motivate the use of RTX in treating immune-mediated GD.

METHODS

Study design and setting

This retrospective study was conducted at the nephrology outpatient clinic of Universitas Academic Hospital (UAH), a tertiary-level institution in central South Africa. The clinic is run by two specialist nephrologists and a nephrology fellow, who was the principal investigator. Patients with GD are generally managed according to the latest KDIGO guidelines using CNI, MMF, CYP, and rapidly tapered GC. RTX use is limited only to cases of treatment failure of the initial regimen or when the toxicity of the other treatment options is of concern. This approach is primarily due to concerns regarding financial cost. The dose of RTX is generally calculated as 375 mg/m^2 of the estimated body surface area, and most patients receive 1 g per dose. The doses are given on day 0 and then again after 14 days. The dosing is repeated after six months based on clinical response, which is evaluated through the patient's physical condition, urine protein–creatinine ratio (uPCR), serum albumin and creatinine-based estimated glomerular filtration rate (eGFR). To avoid IRR, each dose of RTX is preceded by premedication consisting of 1 g paracetamol orally, 25 mg promethazine, and 100 mg hydrocortisone intravenously administered 30 minutes earlier.

Study participants

The records of all the patients with GD that were treated with at least a single dose of RTX during the study period from 1 January 2016 until 31 December 2023 were included for analysis.

Variables

The register of patients seen at the nephrology clinic was used to identify all patients that were treated with RTX during the period 2016–2023. Electronic and paper medical records were perused to obtain the demographic, clinical and laboratory information that was captured on a data tool constructed on a REDCap electronic platform (REDCap Consortium, Nashville, TN, USA). The indication for RTX treatment, adverse effects, number of RTX doses and estimated cost of RTX therapy per patient were recorded. Based on this information, the investigators assessed the patient outcomes as complete response (CR), defined as a decline in proteinuria to less than 300 mg per day with stable creatinine and serum albumin above 35 g/L; partial response (PR), defined as a decrease in proteinuria to between 300 mg and 3 500 mg per day or more than 50% from the baseline; initiation of dialysis; worsening of eGFR; and death.

Statistical analysis

Data analysis was performed by the Department of Biostatistics at the University of the Free State, using R, version 4.4.3 (R Foundation for Statistical Computing, Vienna, Austria). Categorical data were summarised by means of frequencies and percentages. Medians and interquartile ranges (IQR) were calculated for numerical data.

Ethical considerations

Full ethics approval for the research was granted by the Health Sciences Research Committee of the University of the Free State (reference number UFS-HSD2024/0218/3004). Due to the retrospective nature of the study and the use of only archived patient records as the source of information, informed consent was not applicable. The data captured were anonymised, and no identifiable patient information was collected.

RESULTS

A total of 17 patient files were reviewed. The demographic characteristics, comorbidities, and treatment-related information are summarised in Table 1. The patients' median age was 25 (IQR 20–28 years). The majority of patients (88%) were Black, and approximately two-thirds were female (65%). Five (29%) patients were HIV-positive. On average, the interval between diagnosis of GD and initiation of RTX therapy was 36 months. The most common indication for RTX therapy was failed previous treatment, which occurred in 12 (71%) patients. Only two (12%) patients experienced adverse effects from RTX. A complete or partial response to RTX was observed in 4 (24%) and 6 (35%) patients, respectively. In three patients, it was necessary to start dialysis.

Table 2 shows the clinical findings of patients at the time of GD diagnosis, at the start of RTX therapy, and after RTX treatment. At diagnosis, 10 (59%) patients had microhaematuria, compared to 6 (35%) after receiving RTX. The median eGFR at diagnosis was 100 (IQR 64–20) mL/min/1.73 m^2, which decreased to 68 (IQR 20–95) mL/min/1.73 m^2 after administration of RTX.

All the patients in the study had a glomerular disease diagnosed on a kidney biopsy and subsequent histological

Table 1. Demographic characteristics, type of glomerular disease (GD), comorbidities, and treatment-related information of patients with GD treated with rituximab (RTX) (N = 17).

Variable	n (%)
Sex	
Female	6 (35)
Male	11 (65)
Race	
Black	15 (88)
White	1 (6)
Mixed ethnicity	1 (6)
Type of glomerular disease	
Membranous nephropathy (MN)	7 (41)
Lupus nephritis (LN)	5 (29)
Minimal change disease (MCD)	2 (12)
Focal segmental glomerular sclerosis (FSGS)	2 (12)
C1q nephropathy	1 (6)
Comorbidities	
HIV infection	5 (29)
Hypertension	2 (12)
Other*	7 (41)
Indications for RTX therapy	
Failed previous regimen	12 (71)
Adverse effects from the previous regimen	1 (6)
Not recorded	4 (24)
Adverse effects from RTX	
Infusion-related reaction	1 (6)
Pneumonia	1 (6)
Outcomes of patients receiving RTX therapy	
Complete response	4 (24)
Partial response	6 (35)
No response	2 (12)
Progressed to dialysis	3 (18)
Deteriorating eGFR	1 (6)
Death	1 (6)

Abbreviations: C1q, complement component 1q; eGFR, estimated glomerular filtration rate.
*Other comorbidities included diabetes mellitus, osteoarthritis, and obesity.

Table 2. Clinical and laboratory findings of patients with glomerular disease treated with rituximab (N = 17).

Stage	Microhaematuria	uPCR (g/mmol)	Serum albumin (g/L)	Serum creatinine (µmol/L)	eGFR (mL/min/1.73 m²)
	n (%)	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)
Normal laboratory values	<3 RBC/HPF	≤ 0.015	35–52	Male: 64–104 Female: 53–97	≥ 90
At the diagnosis of glomerular disease	10 (59)	0.62 (0.50–0.73)	10 (8–18)	73 (63–186)	100 (64–120)
At the start of rituximab	7 (41)	0.59 (0.38–0.62)	15 (8–23)	109 (64–120)	73 (26–112)
After rituximab therapy	6 (35)	0.20 (0.05–0.53)	27 (15–37)	96 (77–288)	68 (20–95)

Abbreviations: RBC/HPF, red blood cells per high-power field on microscopic evaluation; uPCR, urine protein–creatinine ratio; eGFR, estimated glomerular filtration rate; IQR, interquartile range.

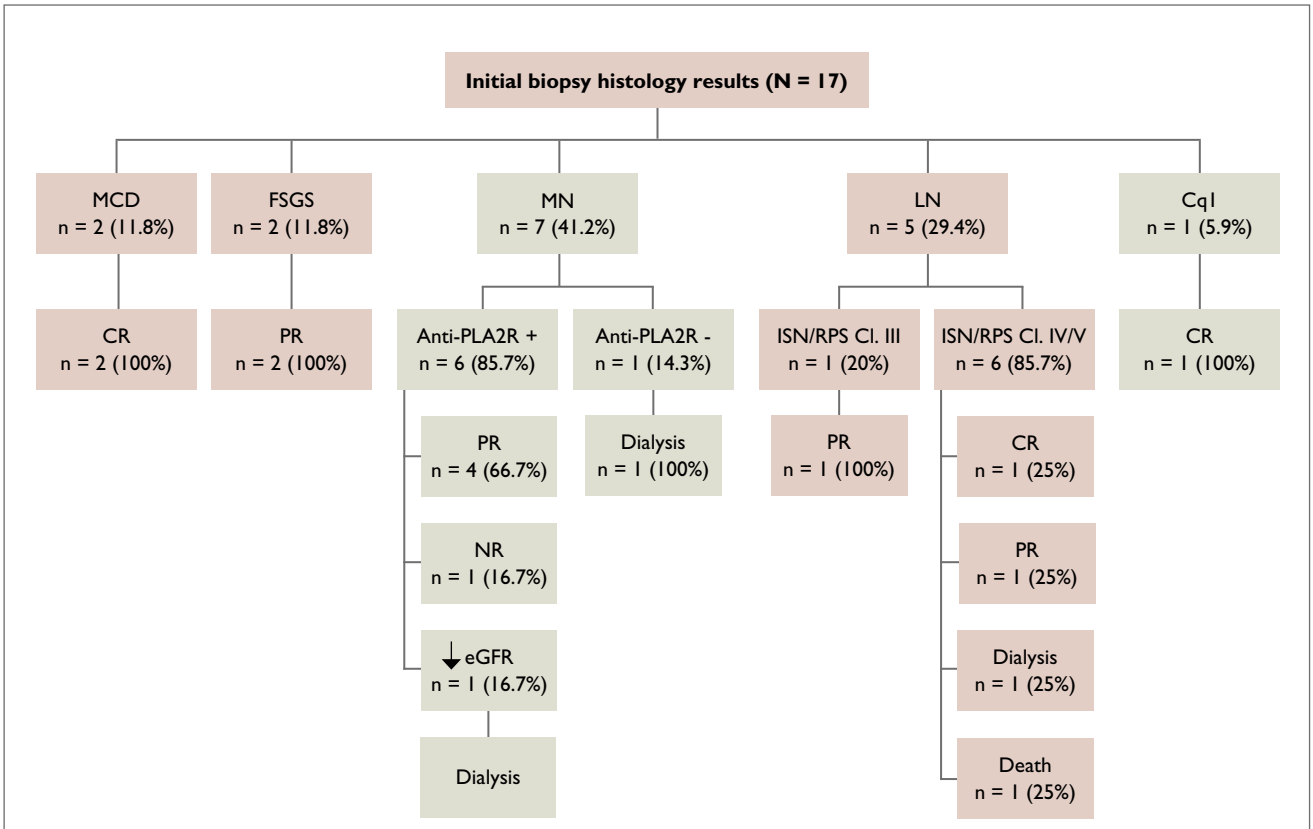

Figure 1. The initial histological diagnosis and outcomes of patients with glomerular disease treated with rituximab.
Abbreviations: Cl., class; Cq1, complement component q1; CR, complete response; eGFR, estimated glomerular filtration rate; FSGS, focal segmental glomerular sclerosis; ISN/RPS, International Society of Nephrology/Renal Pathology Society; LN, lupus nephritis; MCD, minimal change disease; MN, membranous nephropathy; PLA2R, phospholipase A2 receptor; PR, partial response.

investigations. These findings and the outcomes of patients with each type of GD are shown in Figure 1.

In four (24%) patient files, no information regarding previous treatment for GD had been recorded. Of the 13 patients with information available, 12 (92%) were initiated on RTX because of previous treatment failure, whereas in one patient, treatment was adapted after developing severe CYP-related pneumonia. The distribution of agents in these patients' previous regimens is shown in Table 3. The median duration of treatment with the previous immunosuppressive regimen was 36 months (IQR 6–48 months).

The median number of RTX doses administered per patient was four, with an IQR of two to eight doses. The estimated median cost associated with treatment was approximately ZAR 42 700 (South African rand) per patient, with an IQR of ZAR 32000–63 900. One patient experienced severe pneumonia following the second RTX dose, and another had an infusion-related reaction (IRR) to

Table 3. Agents used in previous regimens of patients with glomerular disease (N = 17).

Immunosuppressive agents	n (%)
No treatment information recorded	4 (24)
Glucocorticoids (GC)	13 (77)
Calcineurin inhibitors (CNI)	9 (53)
Mycophenolate mofetil (MMF)	10 (59)
Cyclophosphamide (CYP)	6 (35)
Azathioprine	0 (0)

Abbreviations: C1q, complement component 1q; eGFR, estimated glomerular filtration rate.
*Other comorbidities included diabetes mellitus, osteoarthritis, and obesity.

RTX. Treatment was discontinued for both patients, who were subsequently managed with their prior immunosuppressive regimen.

As illustrated in Figure 1, an initial histological diagnosis of MCD was made in two participants, both males aged 20 and 24 years, respectively. In one of these patients, the indication for RTX was failed initial immunosuppressive treatment. This patient turned out to have FSGS on a repeat kidney biopsy. Both patients achieved a complete response after receiving one cycle of RTX.

Two patients had been diagnosed with FSGS on their initial kidney biopsy results after presenting with a nephrotic syndrome characterised by proteinuria of ≥0.42 g/mmol. Both patients had received an immunosuppressive regimen comprising steroids and CNI, and one also had a course of CYP. RTX was initiated in these patients with their serum albumin levels at 10 g/L and 13 g/L, respectively. Their renal function was impaired, with respective eGFR values of 38 mL/min/1.73 m^2 and 61 mL/min/1.73 m^2. These two patients demonstrated a partial response to RTX treatment.

Most of the patients (n = 7; 41%) had MN, with anti-PLA2R antibodies detected in six (86%) of the MN group. All these patients were previously treated with cyclical prednisone and oral CYP (modified Ponticelli regimen). A heterogeneous response to RTX was observed in patients with MN as their initial kidney biopsy diagnosis. A partial response was achieved in four (57%) patients; no response, and worsened eGFR each occurred in one patient in this group. The patients with MN had a median age of 38 (IQR 25–53) years. Their median uPCR at RTX initiation was 0.59 (IQR 0.39–0.91) g/mmol, which decreased to a median uPCR of 0.33 (IQR 0.05–0.71) g/mmol after RTX therapy. The median serum albumin increased slightly from 20 (IQR 9–23) g/L to 22 (IQR 13–34) g/L. The single patient who had a negative anti-PLA2R MN response also failed the modified Ponticelli regimen and was treated with four doses of RTX but deteriorated despite therapy and required dialysis.

Five (29%) patients, all female, had been diagnosed with LN on the initial kidney biopsy histology. As shown in Figure 1, only one of the LN patients had class III of the International Society of Nephrology/Renal Pathology Society (ISN/RPS) classification of lupus nephropathy. This patient failed a combination of steroid therapy and MMF but achieved a partial response when treated with six doses of RTX. The other four patients in this group had a diagnosis of ISN/RPS class IV/V LN on their initial kidney biopsy results. These patients were treated with RTX after failing GC and MMF therapy. Unfortunately, one of these patients died from progressively deteriorating kidney failure after receiving a single RTX dose. A single patient progressed to dialysis-requiring kidney failure, one achieved a complete response, and the other one produced a partial response.

Only one patient had C1q nephropathy. This subject was a 27-year-old male who presented with nephrotic range proteinuria. He was initially treated with steroids but failed to respond and was subsequently given three doses of RTX. The uPCR at the initiation of RTX was 0.62 g/mmol, which decreased to 0.15 g/mmol. His serum albumin at the initiation of RTX was 7 g/L and improved to 36 g/L after RTX therapy. His eGFR remained unchanged at 95 mL/min/1.73 m^2. This patient achieved a complete response.

Five patients with HIV represented 29% of the cohort. Most HIV-positive patients had MN (n = 4; 80%), while one had LN ISN/RPS class III/IV. Three (75%) of the HIV-positive patients in the MN group had positive findings for anti-PLA2R, compared to one patient who recorded a negative anti-PLA2R test (P = 0.48). Their median CD4 count was 517 (IQR 477–701) cells/μL. The HIV viral load was suppressed in four of the HIV-positive patients. The median uPCR at RTX initiation was 0.4 (IQR 0.38–0.68) g/mmol, decreasing to 0.06 (IQR 0.04–0.44) g/mmol after RTX therapy. The median serum albumin level of the HIV-positive patients at the start of RTX was 20 (IQR 16–22) g/L, which improved to 31 (IQR 22–35) g/L after RTX. The median eGFR at RTX initiation was 66 (IQR: 29-77) mL/min/1.73 m^2, and 68 (IQR 66–83) mL/min/1.73 m^2 after RTX. Three HIV-positive patients demonstrated a complete response after RTX treatment, and two had a partial response. Although, one of the patients with HIV had a fatal pneumonia, the majority (75%) of the HIV-positive patients tolerated RTX very well.

DISCUSSION

This study provides real-world data on the use of RTX for biopsy-proven glomerular diseases at a tertiary centre in central South Africa, a setting where access to biological therapy is tightly restricted by cost. The cohort is notable for its predominantly Black (88%), mostly young female population, with a substantial proportion of HIV-positive patients, a group largely underrepresented in randomised controlled trials. Nearly half of the cohort had MN and a third had LN. The principal indication of RTX therapy was inadequate response to or failure of prior immunosuppression treatment. Despite these challenges, more than half of the patients manifested a complete or partial response, and treatment was generally well tolerated. These findings add context-specific evidence to the global literature and contribute data from a population in whom GD, particularly lupus nephritis, is often more aggressive and associated with poorer outcomes.

Contrary to trial settings where RTX is frequently used earlier in the course of disease, patients in this study received RTX mainly after prolonged exposure to conventional immunosuppression, reflecting real-world prescribing constraints in a resource-limited setting. It took a median of 36 months from the diagnosis of GD before the patient could be treated with RTX. The delay in starting RTX implies that the patient would have been exposed to potentially toxic therapy while kidney damage progressed. Plasma cells and memory B cells that lack RTX-targeted CD20 receptors would continue to be produced during this period. Consequently, by the time RTX was initiated, potential efficacy would have been reduced [1]. The reduced effectiveness of RTX likely led to complete responses in fewer than a quarter of patients, with partial responses in about one-third of patients. Overall, 59% of patients demonstrated some degree of remission in response to RTX. The study population, however, was small compared to RCTs conducted in formulating the RTX prescribing guidelines, and these data may change in future studies involving more patients.

The uPCR at the start of RTX was in the nephrotic range of 0.59 (IQR 0.38–0.62) g/mmol for all patients. Nephrotic range proteinuria is associated with poor outcomes [2]. Thus, according to international guidelines, such patients should be candidates for intensifying therapy. This would also require optimising antiproteinuric agents such as renin–angiotensin–aldosterone system inhibitors (RAASi) or sodium–glucose cotransporter-2 inhibitors (SGLT2i) where appropriate [3]. This study did not explore the use of antiproteinuric agents. The median uPCR decreased by over 50% to 0.20 (IQR 0.05–0.53) m/mmol, similar to findings recorded in various trials such as the STARMEN, GEMRITUX, and RY-CYCLO studies [4,5].

Patients with MN had relatively preserved kidney function and thus were initiated on RTX with better chances of a good response; hence, for this MN cohort, the majority (57%) achieved a partial response after RTX treatment. This finding is comparable to the results of RCTs, such as the MENTOR trial, in which 60% of patients treated with RTX achieved a complete or partial response, while 52% of the comparison group on cyclosporine also demonstrated a similar response [8]. A qualitative anti-PLAR2R antibody test was positive in 6 (86%) MN patients. However, the study centre could not perform a quantitative assay for risk categorisation and monitoring treatment response as recommended by the KDIGO 2024 guidelines [8]. It remains to be determined if RTX would have a similar effect in primary MN associated with an array of newer antigens continually being discovered.

In this study, LN patients had a median age of 20 (IQR 17–21) years, which was comparable to that of the patients enrolled in the LUNAR trial [9]. The nephrotic range proteinuria in our cohort was almost twice that of the LUNAR trial cohort. The patients in our study were treated with RTX after failing the initial CYP, GC and MMF regimens. LN patients in this study had a complete or partial response in approximately 50% of the cases, and the remainder had unfavourable outcomes including death, dialysis and worsened eGFR. In the LUNAR trial, 56% of the patients who received RTX had a complete or partial response [9]. LN is known to be aggressive in Black patients [10]. The significant proportion of Black patients in this study (88%) may be an additional factor in the lower rate of complete and partial response observed in comparison to LUNAR trial findings.

Patients with podocytopathies (MCD and FSGS) demonstrated complete or partial responses. Only two patients were diagnosed with each of these types of GD, suggesting that studies with a larger sample might explore the use of RTX in these conditions more reliably. It has been found that primary FSGS with circulating nephritic factor or steroid-sensitive MCD shows a better response to RTX when compared to genetic podocytopathies [11].

HIV-positive patients in our study had relatively good outcomes. The infectious complications were fairly similar to those of the HIV-negative subjects. This was observed despite the concerns of worsened immunosuppression raised in the literature regarding the use of RTX in HIV-positive oncohaematological patients [12,13]. Alfano et al. [14] reported that two of the patients in their cases who had received RTX for immune-mediated GD developed severe pneumonia. They therefore emphasised the impor-

tance of using RTX with caution [14]. We observed more anti-PLA2R positivity among HIV-positive patients, although no clear difference was evident. This noteworthy observation has also been recorded in a study by Nikolopoulou et al. [16]. More prospective studies are needed in the HIV-positive population with glomerular diseases.

Only two patients showed adverse effects, demonstrating RTX's safety. Lovelock et al. also found RTX to be a safe drug when used in treating refractory rheumatoid arthritis in a patient cohort comprising predominantly Black patients [17], similar to our study. One patient developed severe bacterial pneumonia requiring admission to the intensive care unit. The patient's immunoglobulin levels were not determined, and TB was ruled out. Although TB did not manifest in the patients in this study, Du Toit et al. [18] reported an increased incidence of TB in patients in the Western Cape province of South Africa who were treated with RTX for haematological malignancies or rheumatological conditions. The South African TB guidelines advocate TB screening in patients before starting immunosuppression, including RTX. Patients found to be negative are then given isoniazid preventative therapy (IPT) and routinely monitored for TB [19]. The patients in our study did not receive IPT since they were treated before the updated guidelines were available.

Only one patient had an IRR following RTX administration, reflecting the safety of RTX in our study population. Some authorities have challenged the use of empirical premedication in patients about to receive RTX and even suggested that the side effects of the premedication are more prevalent than actual RTX reactions. Whether anaphylactic reactions to RTX can be avoided by premedication has not been validated [20].

Approximately 30% of the patients had poor outcomes in the form of death, progression to dialysis or deteriorating eGFR. This should be considered in the context of the 59% of patients who achieved some degree of disease remission after RTX. These data highlight the economic benefit of treatment with RTX, as the cost of dialysis for patients failing to achieve remission and progressing to kidney failure is estimated to be at least US$25 000 annually, significantly higher than the cost of RTX therapy (up to ZAR 64 000 in our study, or approximately US$3 200 at the time of writing) [21,22]. Furthermore, RTX therapy for GD provides additional benefits by reducing patient morbidity and improving socio-economic conditions [23,24].

This study has several important limitations. It represents the experience of a single centre with a small sample size (17 patients), limiting statistical power and generalisability. The retrospective design introduced the possibility of incomplete documentation, missing data and selection bias, particularly as RTX required special motivation and was reserved for refractory cases. There was no comparator group treated with alternative regimens, precluding direct assessment of relative efficacy. RTX was initiated late in the course of disease (median 36 months after diagnosis), which might have underestimated its potential benefit if used earlier. Treatment response was assessed primarily using clinical parameters such as proteinuria and eGFR. Mechanistic biomarkers, including CD19-positive B-cell monitoring and quantitative anti-PLA2R titres, were not available. The absence of routine immunoglobulin monitoring further limited interpretation of infectious risk. In addition, the use and optimisation of adjunctive antiproteinuric therapies such as RAAS inhibitors or SGLT2 inhibitors were not systematically evaluated. The follow-up duration varied, and long-term renal survival outcomes could not be robustly assessed.

Despite these limitations, the study reflects outcomes of routine clinical practice in a resource-constrained setting, and highlights the feasibility, safety and potential economic rationale for early RTX use in selected patients with GD. Measuring CD19-positive cells can be used to determine B-cell depletion and guide therapy [1,25], but this is not available in our centre.

CONCLUSION

These findings of a descriptive study indicated that more than half of the patients treated with rituximab showed clinical improvement. Although these outcomes are promising, further prospective research is necessary to validate the efficacy of rituximab in the context of glomerular disease.

Conflict of interest

The authors have no conflicts of interest to declare.

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