Research Article
Volume 15:2, 2025

Journal of Nephrology & Therapeutics

ISSN: 2161-0959 Open Access

Histological Aspects of Nephrotic Syndrome in the Nephrology Department of the National Hospital of Zinder (NHZ)

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Abstract

Introduction: Nephrotic Syndrome (NS) is a common reason for consultation in nephrology, particularly in Niger. Kidney biopsy is an essential tool for the diagnosis and assessment of the prognosis of renal diseases especially those with nephrotic syndrome. Histological characterization allows for specific treatment to be instituted, thus facilitating better management of patients. However, there is paucity of reports from this part of the world. Our study aims to describe the histopathological aspects of nephrotic syndrome at the National Hospital of Zinder.

Methods: This was a descriptive cross-sectional study that took place over a 4-year period (between January 1, 2020 and August 31, 2023) in the Nephrology Department of the National Hospital of Zinder. Patients with NS who consented and had no contraindications underwent kidney biopsy following standard department protocol.

Results: We studied 62 patients over the study period. The mean age of the patients was 31.4 ± 16.56 years and age range of 15 and 34 years. The sex ratio was 1.81 in favor of men. The main medical history of the patients was arterial hypertension 33.87% of cases. The mean 24-hour proteinuria was 5.56 ± 3.33 g/24 h. The average number of glomeruli per biopsy core was 9 ± 6 with a range of 2 and 32. The histopathological lesions found were: Focal Segmental Glomerulosclerosis (FSGS) (25.81%), Membranoproliferative Glomerulonephritis (MPGN) (20.97%), MGL (19.35%), lupus GN (6.45%), GNA (3.23%), diabetic nephropathy (3.23%) and extra membranous glomerulonephritis EMG (2.6%).

Keywords: Nephrotic syndrome • Kidney biopsy • Zinder • Hypoalbuminemia • Burkitt lymphoma

Introduction

Nephrotic Syndrome (NS) has not undergone major changes from a clinical and para-clinical point of view and remains a frequent reason for consultation in nephrology and internal medicine [1,2]. The contribution of the Percutaneous Kidney Biopsy (PKB) in the diagnosis, the therapeutic choice and the prognostic evaluation of nephrotic syndrome is considerable. Kidney biopsy makes it possible to specify a diagnosis, to qualify the degree of involvement, to orient and adapt a therapy, and to propose a prognosis. The PKB includes a histopathological and immunohistochemical study [3-5]. The PKB highlights a fundamental fact: Each histopathological type corresponds to a particular clinical and evolutionary profile. From the practical point of view, the PKB is the only one that allows an assessment of the prognosis. In a study carried out in Mali, Focal Segmental Glomerulosclerosis (FSGS) and Minimal Change Disease (MCD) were the main histological lesions found in a series of 12 PKB

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Received: 26 October, 2025, Manuscript No. JNT-25-172382; **Editor assigned:** 29 October, 2025, PreQC No. JNT-25-172382 (PQ); **Reviewed:** 12 November, 2025, QC No. JNT-25-172382; **Revised:** 10 December, 2025, Manuscript No. JNT-25-172382 (R); **Published:** 17 December, 2025, DOI: 10.37421/2161-0959.2025.15.554

reported [6]. A similar observation was made in Algeria by Azouaou L, et al. in 2015 [7]. A study carried out in Guinea between 2003 and 2004 reported on 20 patients, the glomerular lesions observed were FSGS in 40%, then MCD in 35%, GEM 5% [8]. In a study conducted in France, the histopathological results found: 49 cases of MCD, 13 cases of HSF [9]. From these different data, a multitude of combinations is possible, resulting in a certain number of syndromes. In Niger, published works are scarce on this topic, especially at the National Hospital. The objective of this study was to describe the histopathological aspects of nephrotic syndrome at the Zinder National Hospital.

Materials and Methods

This is a retrospective review of all nephrotic syndrome patients who had PKB seen at the Nephrology Department of the National Hospital of Zinder (NHZ), over a period of 4 years (January 1, 2020 to August 31, 2023). Kidney biopsy were performed as per the departmental protocol after obtaining informed from the patient, using ultrasound-guided spring-loaded automated biopsy guns BARD. At least two cores were taken for analysis (optical microscopy and immunohistochemistry).

Other information retrieved from the patients' records include the socio-demographic (age, gender, background), clinical presentations (hematuria, proteinuria, edema) and laboratory results (creatinaemia, urea, 24-hour proteinuria, serum albumin) and the histopathological diagnosis.

The data obtained were analyzed using the EPI INFO software version 7.2.4.

Research authorization letter was issued by the NHZ through the Technical Advisory Committee prior to data collection. Patients' personal identification information was removed to respect their privacy and ensure anonymity before the analysis of the data. All the collected data were carefully and securely kept in a password-protected computer file to ensure confidentiality.

Results

During the study period, we found that 500 patients had indications for PKB, but only 150 (30%) underwent kidney biopsy, with nephrotic syndrome being the indication in 62 patients (41%).

The mean age was 31.4 ± 16.6 years with a range of 15 and 34 years. The dominant age group was from 15 to 34 years old, *i.e.*, 51.61% (Table 1). A male predominance was found with a male/female ratio (M/F) of 1.81.

Age	Frequency	Percentage %
<15	8	12.90
(15-35)	32	51.61
(35-60)	16	25.81
≥ 60	6	9.68
Total	62	100

Table 1. Patients' distribution by age at nephrology dialysis department in 2023.

The main clinical presentation was lower limb swelling noted in 79.03% of the study population. Hypertension was noted in 33.87% followed by long-term herbal medicine consumption (20.97%) and diabetes mellitus (6.45%) (Figure 1). Half of the patients (50.00%) had a negative hematuria on the urine strip performed before the KB and the proteinuria was ≥ 3% (3+) in 79.03% of cases. More than half of the patients (54.84%) had high blood creatinine. Albuminemia was less than 20 g/l in 74.19% of patients (n=46) and hypoprotidemia in 88.7% of patients (n=55). The 24-hour proteinuria averaged 5.56 g/24 h ± 3.33, it was nephrotic in 92% of cases (≥ 3 g/24 h).

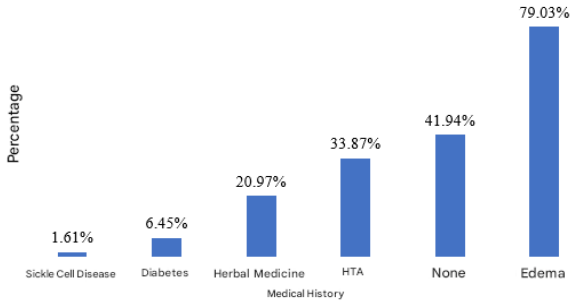

Figure 1. NS patient's distribution by history in the nephrology/dialysis department in 2023.

All biopsies were studied by both light microscopy and immunohistochemistry. The number of glomeruli per biopsy core averaged 9 ± 6. FSGS was the predominant primary glomerular lesion (25.81%) followed by Membranoproliferative Glomerulonephritis (MPGN) type 1 (20.97%). Among the secondary glomerular lesions, Lupus Nephritis (LN) class I predominated in 6.45% of cases followed by diabetic nephropathy 3.23% of cases. A male predominance was found in all histopathologicallesions with the exception of lupus nephropathies where a female predominance was noted.

Discussion

The findings from this study highlighted the difficulties in carrying out of KBP both in our hospital as among the 500 patients with the indication, only 30% had it. This could be as a result of the high cost involved in the procurement of the biopsy gun as well as the cost of the histopathological evaluation of the specimen which could only be done outside of our facility,

Sixty-two (62) patients had a diagnosis of nephrotic syndrome out of a total of 150 KBP performed, *i.e.*, a rate of 41.33%, this is similar to reports by Ben Salem (41.8%) [10,11]. Higher frequencies were found by Mbarki, Mhamedi and Benzouina, who respectively reported 64.3%, 61% and 59.7% [12-14].

The average age of our patients was 31.35 years. The same result was found in several studies, in particular that of Zajjari in Morocco in 2011 and Seydou Diallo in Mali in 2011 [15,16]. On the other hand, lower averages were reported by Bah Apha Omar in Guinea Conakry in 2011 and ML Kaba in Guinea Conakry in 2011, both of whom were 26.2 years old [17,18].

A male predominance was found in our study with a sex ratio of 1.81. Several authors have reported the same result [19,20]. However, a female predominance was found in other series [12,21].

In our patients, the main antecedents found were: Edema of the lower limbs (79.03%), hypertension (33.87%), long-term herbal medicine consumption (20.97%) and diabetes mellitus (6.45%). The same observation was made in Benin, Morocco, Ivory Coast, Senegal and Congo [22-26]. Unlike in developed countries where they are almost absent, oedema is most often found among Black Africans; this difference could be explained by the delay in presentation by our patients, tending to consult at very advanced stages of the disease.

In our study, 74.19% of patients had severe hypoalbuminemia. Severe hypoalbuminemia is a significant factor in the occurrence of venous thrombosis, hence the need for preventive anticoagulation [27].

The 24-hour proteinuria in 92% of our patients was ≥ 3 g/24 h, the other 8% represented patients with corticosteroid-dependent nephrotic syndrome under treatment.

In this study, primary glomerular lesions accounted for 88.71% and secondary 11.29%. These results are similar to those of authors such as M. Ben Salem and M. Seydou [11,16] who found a predominance of lesions of primary glomerular nephropathies. On the other hand, some authors such as H. Benzouina and Houda Mbarki [14,11] found a predominance of secondary glomerular nephropathies in their studies.

The main primary glomerular lesions were FSGS (25.81%) MPGN type 1 (20.97%), and MCD (19.35).

Secondary glomerular lesions were Lupus Nephritis (LN) (6.45%), Diabetic Nephropathy (DN) (3.23%) and Burkitt Lymphoma (BL) (1.61%).

Segmental and focal hyalinosis (FSGS) represented in our study 25.81% (16 cases) of renal biopsies, this result was close to those of H. Mbarki, et al. 12.1%, Traore, et al. 16.0% and Mhamedi 18.0% [12,6,13]. On the other hand, Seydou Diallo Alassane, Diouf B and Bah Alpha reported 50%, 47% and 40% [24,28,18].

In our study, Membrane-Proliferative Glomerulonephritis (MPGN) represented 20.97% (13 cases). This result is comparable to that of Traore H, et al. [6] with 15.0% of cases while Bah AO, et al. [17], Alaoui S, et al. [28] and Kalsoy O [1] found respectively 5%, 7.0% and 3.3%. Minimal Change Disease (MCD) was 19.35% (*i.e.*, 9 cases) in our study, representing the 3rd ranked cause of primary nephropathies in our study, it occupies the same rank as in the study by Seydou Alassane Maiga 12.5% [16]. On the other hand, in the study of Ghizlane, et al. it represented the first cause of primary nephrotic syndrome, *i.e.*, in 70.20%, [29]. Lupus nephropathy was the most common glomerulonephritis due to secondary nephrotic syndrome in our study with a rate of 6.45% of cases with a clear predominance female (sex ratio M/F=0.33) [30-33]. The same observation was made by several authors, in particular by H. Traoré, et al. 31.5% [6], Saad Alaoui, et al. 11% [28], M. Ben Salem, et al. 22% [11].

In this study, 35% of patients biopsied for suspected lupus had kidney damage at the time of diagnosis and that 30-60% would develop it during the first ten years of their disease [34].

In our study, renal impairment was present in 6% of patients at the time of diagnosis of lupus, *i.e.*, (Table 2).

Creatinine (µmol/l)				
Histologique lesions	**<120**	**(120-500)**	**≥ 500**	**Total**
EMG	2	0	1	3
GNA	1	0	1	2
MPGN type 1	7	3	3	13

GSD	1	5	2	8
GSN	0	1	0	1
FSGS	3	7	6	16
BL	0	0	1	1
MCD	11	1	0	12
DN	0	1	1	2
LN (Class I)	3	1	0	4
Total	28	19	15	62

Table 2. Patients' distribution by histological lesions and serum creatinine level in the nephrology/dialysis department in 2023.

Diabetic nephropathy represented in our study 3.23% of glomerulonephritis due to secondary nephrotic syndrome. Benzouina's study found lower results with 1.7% of cases [14].

In this study, these were the patients followed in the department who did not present diabetic retinopathy, nevertheless both of the 2 patients also presented with nephrotic proteinuria.

We can thus deduce that the absence of diabetic retinopathy in diabetes does not necessarily eliminate diabetic nephropathy until proven otherwise.

Conclusion

Nephrotic syndrome is a frequent reason for consultation in a nephrological setting in Niger. In our study, young subjects were the most affected with a male predominance. The main antecedents were edema of the lower extremities and high blood pressure. Primary glomerular lesions were predominant. The most common histological lesions were FSGS, MPGN type 1, and MCD. Lupus Nephritis (LN) was the main histopathological lesion among secondary glomerular lesions, followed by Diabetic Nephropathy (DN). This work constitutes a good basis for larger-scale multi-centric and prospective studies.

Conflicts of Interest

The authors declare no conflict of interest.

Authors Contributions

All the authors have contributed to the realization of this work.

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How to cite this article: Diongole, Moussa H, Garba Abdoul Aziz, Moussa T. Zeinabou M, and Seriba C. Idrissa, et al. "Histological Aspects of Nephrotic Syndrome in the Nephrology Department of the National Hospital of Zinder (NHZ)." *J Nephrol Ther* 15 (2025): 554.