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Epidemiological profile of glomerulopathies in adults. A single-center cross-sectional study, analysis of a six-year historical series.

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Abstract

Introduction: This cross-sectional study aims to determine the prevalence of glomerulopathy types among patients aged 18 years or older undergoing renal biopsy at the Metropolitan Hospital of Quito from January 2019 to August 2024.

Materials and methods: Reports of renal biopsies performed between January 2019 and August 2024 were reviewed. All adult patients aged 18 years or older who underwent a renal biopsy during this period were included. Histological diagnoses were classified according to the World Health Organization (WHO) classification, and their overall prevalence was assessed, as well as their prevalence by gender and age.

Results: A total of 168 renal biopsies were analyzed, revealing a gender distribution of 58.33% male and 41.67% female, with a mean age of 46.81 ± 16.79 years. The most frequent glomerulopathy was focal segmental glomerulosclerosis (FSGS), with a prevalence of 22.49% across all age groups. Other common diagnoses included IgA nephropathy and membranous glomerulonephritis, both with a prevalence of 13.1%. Among those under 40 years of age, lupus nephritis was the most prevalent at 22.54%, whereas among those over 65 years of age, FSGS was the most prevalent at 31.25%. Additionally, there was a higher prevalence of lupus nephritis (27.14%) in the female gender compared to the male, who presented focal segmental glomerular sclerosis (25.56%).

Conclusions: Primary glomerulopathies are the third leading cause of chronic kidney disease worldwide. These conditions are potentially treatable if diagnosed early, preventing their progression and the subsequent need for dialysis. This study provides valuable information on the distribution and prevalence of glomerulopathies, which is essential for improving diagnosis and treatment in our setting.

Keywords: Glomerulopathies, renal biopsy, prevalence, lupus nephritis, focal segmental glomerulosclerosis.

Introduction

Glomerular diseases represent one of the main causes of renal morbidity globally and are the third leading cause of progression to chronic kidney disease (CKD) requiring renal replacement therapy [1-3]. Due to their impact on public health, early identification of these histological patterns is necessary to implement treatments that slow the decline in renal function [4].

In Latin America, some studies have documented the prevalence of glomerulopathies [5-9], but comprehensive, up-to-date data are still lacking to characterize their distribution across different national contexts. It has been observed that the prevalence of these diseases can vary considerably across geographic, ethnic, and socioeconomic contexts [8-9], which prevents the direct extrapolation of data from other regions of the world to the local population.

In Ecuador, epidemiological data on kidney disease are limited, hindering the development of therapeutic protocols grounded in the realities of the national healthcare system. Analyzing case series in referral centers not only allows us to understand the behavior of diseases such as focal segmental glomerulosclerosis and lupus nephritis, but also reveals how variables such as age and gender influence their presentation.

In this context, the present study aims to determine the prevalence of different types of glomerulopathies in patients over 18 years of age undergoing renal biopsy at the Metropolitan Hospital of Quito during the period between January 2019 and August 2024, and to provide essential local evidence to optimize the diagnostic and clinical approach in our population.

Materials and methods

Studio design

This is an observational, cross-sectional study. The source is retrospective.

Scenery

This study was conducted in the Nephrology and Pathology Service of the Metropolitan Hospital of Quito, Ecuador. The study period was from January 1, 2019 to September 30, 2024.

Participants

Adult patients over 18 years of age with proteinuria, hematuria, and azotemia, who were candidates for diagnostic renal biopsy, were included. Records of patients with renal transplant biopsies were excluded.

Variables

The sociodemographic variables were: age, sex, medical history (hypertension, diabetes, autoimmune diseases). The histological diagnosis was determined.

Data sources/measurements

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The source was direct. Informed consent was obtained from all participants for renal biopsy. The WHO classification of glomerulopathies was used for histological diagnoses [1].

Biases

The surveys were administered in a standardized manner by the principal investigator, using a pre-established guide approved in the research protocol. The information was independently reviewed by two researchers and recorded in a copy. Only records with complete agreement were included.

Study size

The sample was probabilistic. The rate of stage 5d chronic kidney disease in the province of Pichincha is 102.63 cases per 100,000 inhabitants (Ministry of Public Health Report, Ecuador, November 2022). In Pichincha, with a population of 3,089,473, it is estimated that the province has 3,171 patients, of whom 94.5% are in hemodialysis programs, totaling 2,996 patients. 98.7% of the cases are in adults; that is, 2,957 cases. With an expected frequency of 3.07% of patients with glomerulopathies in a single hemodialysis center, a 5% confidence interval, and a 99.99% confidence level, the sample size was 113 cases. EPI Info version 7.2 (CDC, Atlanta, March 9, 2025, USA) was used.

Quantitative variables

The results for ordinal variables are presented as frequencies and percentages. The results for scaled variables are presented as averages. Scaled variables were not converted into quantitative variables.

Statistical analysis

Descriptive statistics, including frequency distributions, were used for qualitative variables within each glomerulopathy category. Absolute and relative frequencies (percentages) were calculated for the variables. For quantitative variables, the mean and standard deviation were calculated; for patient age, the minimum and maximum values were also calculated.

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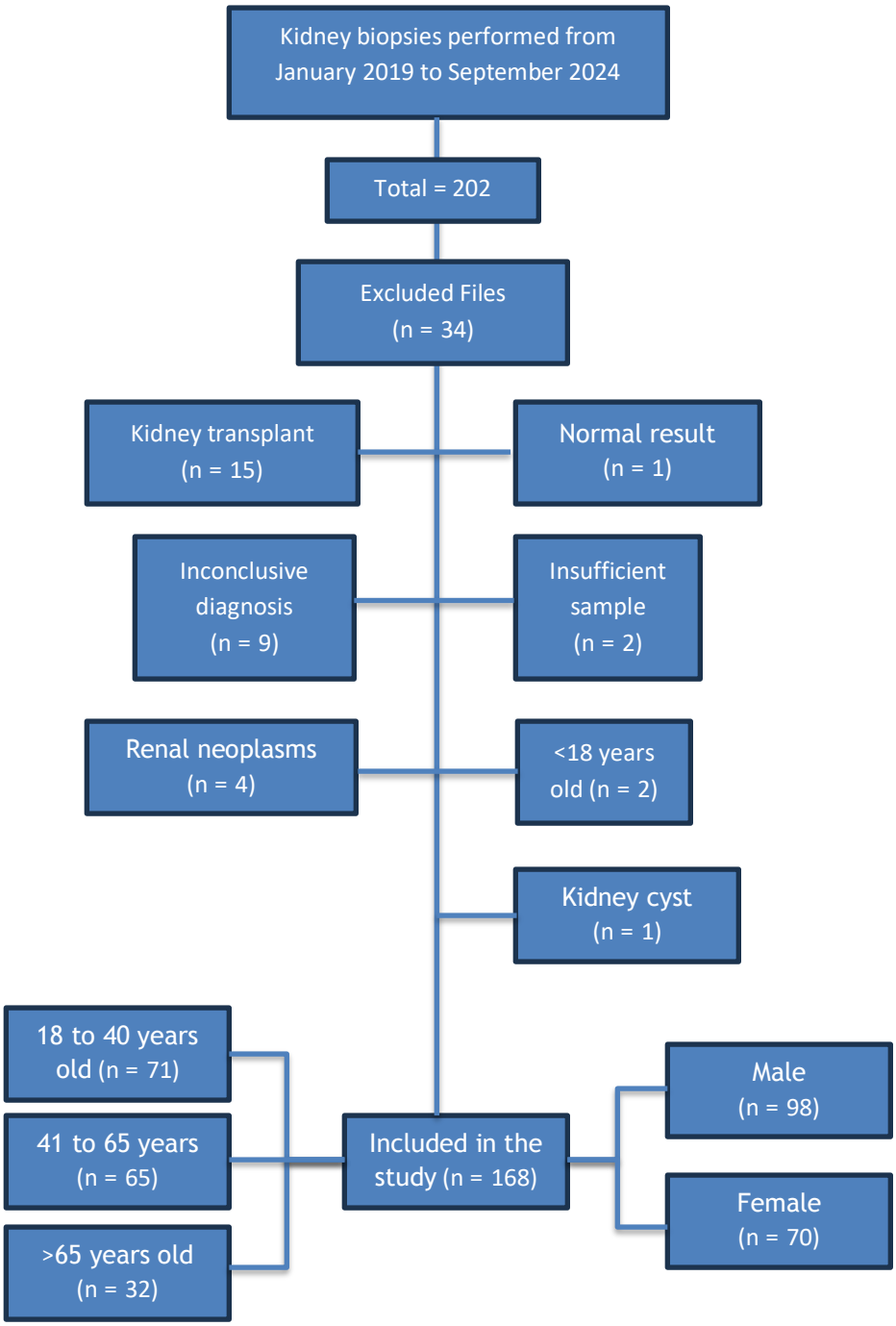
Results

Participants

168 patient records were entered into the study, representing 100% of the sample size (Figure 1).

Figure 1. Flowchart of study participants.



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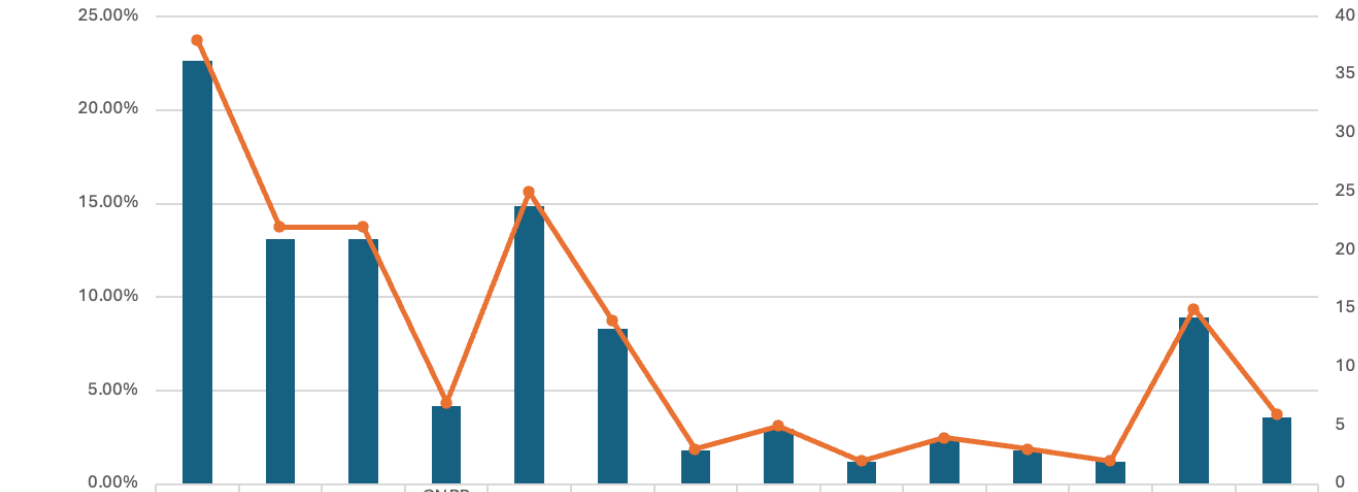
Characteristics of the study population

It was determined that 58.33% were men and 41.67% were women. The average age of the patients was 46.81 ± 16.79 years, and they were divided into three age groups: 18 to 40 years (42.26%), 41 to 65 years (38.69%), and over 65 years (19.05%). The most prevalent glomerulopathies in this population were: focal segmental glomerulosclerosis (22.62%), lupus nephritis (14.88%), IgA nephropathy (13.10%), and membranous glomerulonephritis (13.10%) (Figure 2). Among primary glomerulopathies, the most frequent were glomerulosclerosis (GSG), 22.62% (n=38); IgA nephropathy, 13.10% (n=22); and membranous nephropathy, 13.10% (n=22). Among the secondary glomerulopathies, lupus nephritis stands out at 14.88% (n=25), followed by tubulopathies at 8.33% (n=14) and hypertensive nephropathy at 2.98% (n=5) (Figure 2 and Figure 3).

Gráfico 2. Prevalencia de Glomerulopatias



	GEFyS	NIgA	GNM	GNRP pauciinmune	NL	Tubulopatías	ERD	NH	GMSR	NA	GNC3	ERC	GNCM	OTRAS
Prevalencia	22.62%	13.10%	13.10%	4.17%	14.88%	8.33%	1.79%	2.98%	1.19%	2.38%	1.79%	1.19%	8.93%	3.57%
n	38	22	22	7	25	14	3	5	2	4	3	2	15	6

GEFyS: glomeruloesclerosis focal y segmentaria; **NIgA:** nefropatía por IgA; **GNM:** Glomerulonefritis membranosa; **GNRP:** pauciinmune: glomerulonefritis rápidamente progresiva pauciinmune; **NL:** nefropatía lúpica; **ERD:** enfermedad renal diabética; **NH:** Nefropatía hipertensiva; **GMSR:** gamapatía monoclonal de significado renal; **NA:** nefropatía por amiloidosis; **GNC3:** glomerulonefritis C3; **ERC:** enfermedad renal crónica; **GNMC:** glomerulonefritis de cambios mínimos.

Regarding the distribution of histopathological diagnoses by sex, focal segmental glomerulosclerosis (FSGS) was the most frequent diagnosis in both sexes, accounting for 25.71% in women and 25.51% in men (Figure 4). IgA nephropathy (IgAN) was present in 15.71% of women and 11.22% of men, with no statistically significant difference ($P = 0.56$). Similarly, membranous glomerulonephritis (MGN) was more frequent in men (12.24%) than in women (8.57%), without reaching statistical significance ($P = 0.45$) (Table 1).

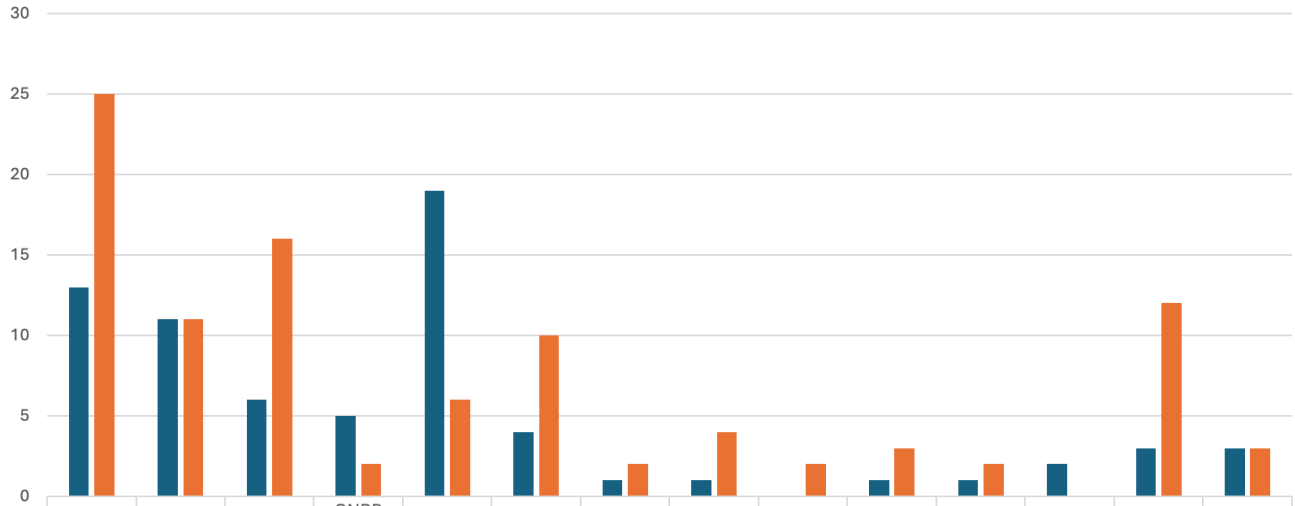
Table 1. Distribution of histopathological diagnosis by sex.

Histopathological Diagnosis	Sex				*P*
	Female n 70 (41.67%)		Male n 98 (58.33%)		
	N	%	n	%	
FGS	13	18.57	25	25.51	0.38
IgA Nephropathy	11	15.71	11	11.22	0.54
MGN	6	8.57	16	16.33	0.22
PiRPGN	5	7.14	2	2.04	0.13
LN	19	27.14	6	6.12	0.0004
Tubulopathies	4	5.71	10	10.20	0.4
DKD	1	1.43	2	2.04	1.0
HN	1	1.43	4	4.08	0.4
MGRS	0	0.00	2	2.04	0.51
AN	1	1.43	3	3.06	0.64
C3GN	1	1.43	2	2.04	1.0
CKD	2	2.86	0	0.00	0.17
MCGN	3	4.29	12	12.24	0.1
Other	3	4.29	3	3.06	0.69

FGS: focal segmental glomerulosclerosis; **IgA nephropathy:** IgA nephropathy; **MGN:** membranous glomerulonephritis; **PiRPGN:** pauci-immune rapidly progressive glomerulonephritis ; **LN:** lupus nephritis; **DKD:** diabetic kidney disease; **HN:** hypertensive nephropathy; **MGRS:** monoclonal gammopathy of renal significance; **AN:** amyloidosis nephropathy; **C3GN:** C3 glomerulonephritis; **CKD:** chronic kidney disease; **MCGN:** minimal change glomerulonephritis.

Lupus nephritis (LN) was significantly more common in women (27.14%) than in men (6.12%) (P=0.0003); this was the only significant difference between genders among the diagnoses. s. Other diagnoses, such as pauci-immune rapidly progressive glomerulonephritis (RPGN), diabetic kidney disease (DKD), hypertensive nephropathy (HN), monoclonal gammopathy of renal significance (MGRS), amyloidosis nephropathy (AN), C3 glomerulonephritis (C3GN), chronic kidney disease (CKD), minimal change disease (MCD), among others, did not show statistically significant differences between sexes ($P > 0.05$ in all cases) (Table 1).

Figura 3.- Distribución de género por diagnóstico histopatológico.



	GEFyS	NIgA	GNM	GNRP pauciinmune	NL	Tubulopatías	ERD	NH	GMSR	NA	GNC3	ERC	GNCM	OTRAS
Mujeres	13	11	6	5	19	4	1	1	0	1	1	2	3	3
Hombres	25	11	16	2	6	10	2	4	2	3	2	0	12	3

GEFyS: glomeruloesclerosis focal y segmentaria; **NIgA:** nefropatía por IgA; **GNM:** Glomerulonefritis membranosa; **GNRP:** pauciinmune: glomerulonefritis rápidamente progresiva pauciinmune; **NL:** nefropatía lúpica; **ERD:** enfermedad renal diabética; **NH:** Nefropatía hipertensiva; **GMSR:** gamapatía monoclonal de significado renal; **NA:** nefropatía por amiloidosis; **GNC3:** glomerulonefritis C3; **ERC:** enfermedad renal crónica; **GNMC:** glomerulonefritis de cambios mínimos.

In the distribution of histopathological diagnoses according to age groups (Table 2), it was observed that the group of patients between 18 and 40 years represented 42.26% of the total cohort, followed by the group of 41 to 65 years (38.69%) and those over 65 years of age (19.05%).

In the 18-40 age group, the most frequent diagnoses were lupus nephritis (LN), with 16 cases (22.54%); lupus glomerulonephritis (LGN), with 15 cases (21.13%); and IgA nephropathy (IgAN), with 11 cases (15.49%). In the 41-65 age group, similar proportions were observed, with LGN being the most frequent at 13 cases (20%), IgAN at 10 cases (15.38%), and focal segmental glomerulosclerosis (FSGS) at 10 cases (15.38%).

In patients over 65 years of age, FSGS was also the predominant diagnosis, with 10 cases (31.25%), followed by tubulopathies and other unclassified pathologies (9.38% each) and MGN (4 cases, 12.50%). It is worth noting that some entities, such as tubulointerstitial nephropathy and mesangial glomerulosclerosis, were infrequent in all age groups, while diagnoses such as chronic renal sclerosis (CRS) and diabetic kidney disease (DKD) were concentrated mainly in older patients (Table 2 and Figure 4).

Table 2. Distribution of histopathological diagnosis by age.

Histopathological Diagnosis	Age ranges					
	18 to 40 n 71 (42.26%)		41 to 65 n 65 (38.69%)		> 65 n 32 (19.05%)	
	n	%	n	%	n	%
GEFyS	15	21.13	13	20.00	10	31.25
NL	16	22.54	7	10.77	2	6.25
NIgA	11	15.49	10	15.38	1	3.13
GNM	8	11.27	10	15.38	4	12.50
GNCM	10	14.08	2	3.08	3	9.38
TUBULOPATHIES	4	5.63	7	10.77	3	9.38
pauci-immune GNRP	1	1.41	4	6.15	2	6.25
OTHER	1	1.41	2	3.08	3	9.38
NH	0	0.00	3	4.62	2	6.25
NA	1	1.41	2	3.08	1	3.13
ERD	0	0.00	2	3.08	1	3.13
GNC3	3	4.23	0	0.00	0	0.00
GMSR	0	0.00	2	3.08	0	0.00
ERC	1	1.41	1	1.54	0	0.00

FGS : focal segmental glomerulosclerosis; **IgA nephropathy:** IgA nephropathy; **MGN:** membranous glomerulonephritis; **PRGN:** pauci-immune : rapidly progressive pauci-immune glomerulonephritis ; **NL:** lupus nephritis; **DRD:** diabetic kidney disease; **NH:** hypertensive nephropathy; **SRGM:** monoclonal gammopathy of renal significance; **NA:** amyloidosis nephropathy; **C3GN:** C3 glomerulonephritis; **CKD:** chronic kidney disease; **MCGN:** minimal change glomerulonephritis.

Discussion

This cross-sectional, retrospective study assessed the prevalence of various glomerulopathies among adults treated at the Metropolitan Hospital of Quito between January 2019 and September 2024. Focal segmental glomerulosclerosis (FSGS) was the most frequent primary glomerulopathy, with a prevalence of 22.62%, followed by lupus nephritis (14.88%) and IgA nephropathy (13.10%). These findings are consistent with previous studies conducted in Latin America, which have also identified FSGS as one of the most prevalent glomerulopathies in adults [10-12]. However, in Asian and Caucasian populations, IgA nephropathy is the most prevalent [13-15]. The prevalence of lupus nephropathy in our sample was particularly high among women, reflecting the trend observed in other international studies, which have identified systemic lupus erythematosus as one of the most common causes of secondary glomerulopathy in young women [13-15].

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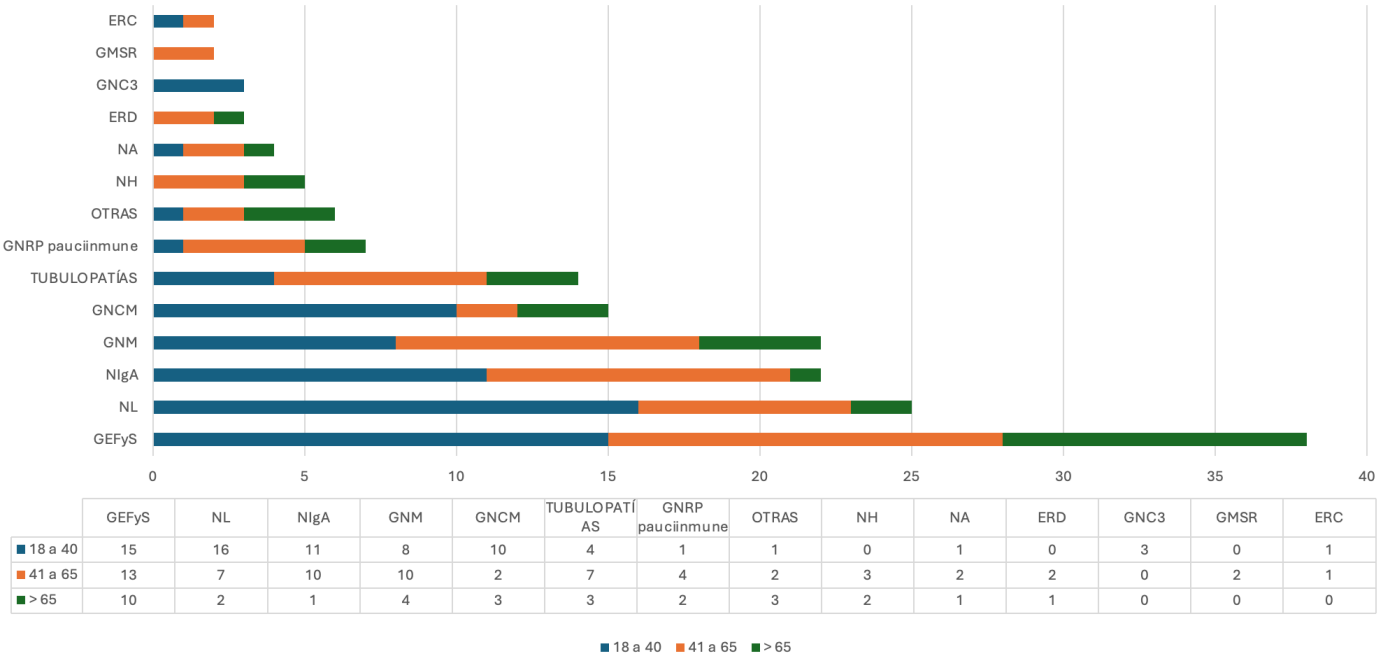
Figura 4. Distribución de los diagnóstico histopatológico por rango de edad.



	GEFyS	NL	NIgA	GNM	GNCM	TUBULOPATÍAS	GNRP pauciinmune	OTRAS	NH	NA	ERD	GNC3	GMSR	ERC
18 a 40	15	16	11	8	10	4	1	1	0	1	0	3	0	1
41 a 65	13	7	10	10	2	7	4	2	3	2	2	0	2	1
> 65	10	2	1	4	3	3	2	3	2	1	1	0	0	0

GEFyS: glomeruloesclerosis focal y segmentaria; **NIgA:** nefropatía por IgA; **GNM:** Glomerulonefritis membranosa; **GNRP:** pauciinmune: glomerulonefritis rápidamente progresiva pauciinmune; **NL:** nefropatía lúpica; **ERD:** enfermedad renal diabética; **NH:** Nefropatía hipertensiva; **GMSR:** gamapatía monoclonal de significado renal; **NA:** nefropatía por amiloidosis; **GNC3:** glomerulonefritis C3; **ERC:** enfermedad renal crónica; **GNMC:** glomerulonefritis de cambios mínimos.

Analysis by age group revealed that, in patients under 40 years of age, lupus nephritis was the most prevalent, while in those over 40 years of age, systemic glomerulonephritis (SGN) and membranous glomerulonephritis were the most common. This pattern is consistent with previous studies showing that primary glomerulopathies, such as SGN, are more frequent in older adult patients, whereas autoimmune diseases, such as lupus nephritis, mainly affect younger patients [16-18].

Although the prevalence of hypertensive nephropathy in our study was low (2.98%), correlating with the low requirement for renal biopsy for the diagnosis and management of this condition, we wish to mention that this pathology is a significant cause of kidney damage. Hypertension is a well-documented risk factor for the progression of glomerulopathies, and its adequate control is essential to prevent chronic kidney disease [19-21] . In this regard, special attention should be paid to the proper control of blood pressure and its effects on renal function in patients with glomerular diseases [22, 23].

One of the strengths of this study is the thoroughness of the histopathological classification of renal biopsies, which has enabled precise identification of the various forms of glomerulopathies in our population. Furthermore, this study highlights the importance of renal biopsy as a fundamental diagnostic tool in the management of glomerulopathies. Early identification of these diseases is essential for initiating specific treatments, which can improve prognosis and prevent progression to end-stage renal disease and subsequent need for chronic dialysis [24-26]. The data obtained in this study also underscore the need for the detection and treatment of glomerulopathies in clinical practice, especially in regions with a high prevalence of autoimmune diseases, such as lupus [27-33].

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Conclusion

This study provides a comprehensive overview of the prevalence of glomerulopathies in adult patients undergoing renal biopsy at the Metropolitan Hospital of Quito between 2019 and 2024. The results show that focal segmental glomerulosclerosis is the most common glomerulopathy in our setting, followed by lupus nephritis, which primarily affects women. Furthermore, a higher prevalence of glomerular diseases was observed in patients over 40 years of age, highlighting the influence of age on the development of autoimmune diseases.

Abbreviations

GEFyS: focal segmental glomerulosclerosis.
NIgA: IgA nephropathy.
GNM: Membranous glomerulonephritis.
GNRP: rapidly progressive glomerulonephritis.
NL: lupus nephritis.
ERD: diabetic kidney disease.
NH: Hypertensive nephropathy.
GMSR: monoclonal gammopathy of renal significance.
NA: amyloidosis nephropathy.
GNC3: C3 glomerulonephritis.
CKD: chronic kidney disease.
GNMC: minimal change glomerulonephritis.

Supplementary information

Supplementary materials have not been declared.

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Authors' contributions

Alex Siza: Conceptualization, data curation, research, visualization, original draft writing.
Francisco Castro: Conceptualization, formal analysis, methodology, project management, resources, software, supervision, validation, writing – review and editing.
Andrés Arteaga: Conceptualization, data curation, research, visualization, and writing of the original draft.
Fernando Jiménez: Conceptualization, data curation, research, visualization, and writing of the original draft.
Washington Osorio: Conceptualization, data curation, research, visualization, and writing of the original draft.
Ma. Elena Urresta: Conceptualization, data curation, research, visualization, and writing of the original draft.
Verónica Remache: Conceptualization, research, visualization, and writing of the original draft.
Andrea Portilla: Conceptualization, research, visualization, and writing of the original draft.

All authors read and approved the final version of the manuscript.

Financing
The study was self-funded by the authors.

Availability of data or materials
The data or materials from this study may be shared upon request to the corresponding author, with a justified academic request.

Statements

Ethics committee approval and consent to participate
The protocol was approved by the Institutional Ethics Committee of the Metropolitan Hospital of Quito, Ecuador.

Consent for publication
This does not apply when specific patient images, radiographs, or photographs are not published.

Conflicts of interest
The authors declare no conflicts of interest.

Use of generative AI
The authors declare that they used generative AI responsibly, without replacing their critical thinking, experience, and judgment. The AI was used under supervision and control to develop the discussion section. The use of the AI tool maintains the privacy and confidentiality of data and contributions, including published and unpublished manuscripts and any personally identifiable information. The journal's policies, which permit the use of generative AI only in the introduction and discussion sections, have been followed. Only limited rights are granted to AI to provide a service.
The accuracy, integrity, and impartiality of all AI-generated results were carefully reviewed and verified to ensure that the manuscript reflects an authentic and original contribution.

Author information
Not provided.

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