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Anti-glomerular Basement Membrane Disease: epidemiological, clinical, laboratory, morphological, and immunophenotypic characteristics

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HIGHLIGHTS

What is already known?

- Antimembrane Basal Glomerular Disease is a rapidly progressive kidney disease.
- Its annual incidence is less than 2 cases per million inhabitants.
- Diagnosis can only be confirmed by kidney biopsy.

What was shown?

- Diagnosed patients were mostly male, with an average age of 46 years.
- Most crescents were proliferative or sclerotic.
- Fibrosis was severe in 44% of cases.

How can the study aggregate to the literature?

- It provides insights into the disease characteristics in Brazil.
- This data may aid in developing prevention and treatment strategies.
- It can help advance research on specific kidney diseases.

ABSTRACT

Introduction: Anti-glomerular basement membrane (anti-GBM) disease is a rare condition, classified as rapidly progressive glomerulonephritis (RPGN), with an annual incidence of less than 2 cases per million inhabitants. It is confirmed by renal biopsy showing crescents on light microscopy, which is associated with diffuse linear Ig Immunostaining along the glomerular basement membrane immunofluorescence. Prognosis depends on the severity of renal dysfunction at initial presentation, and timely diagnosis and early therapy are responsible for renal survival rates. **Methods:** A cross-sectional observational study was conducted using data collected from renal biopsy reports of 124 patients with RPGN. **Results:** The collected sample enabled the study to obtain a p-value <0.05 with significant associations. Patients with anti-GBM RPGN are predominantly male (72%). The mean age found was 46 years (Type I). Regarding the distribution of crescents, Class I showed crescents predominantly within the same evolutionary stage (proliferative or sclerosing). Regarding vascular thickness, vessels of normal thickness or slightly thickened prevailed. The degree of fibrosis was pronounced in 44% in Type I. **Conclusion:** New scientific data on this rare and poorly understood disease, especially in Brazil, were obtained. The morphological pattern showed that anti-GBM disease presents with severe evolutionary stages and pronounced tubulointerstitial involvement, requiring prompt treatment to improve renal and overall survival.

Keywords: Glomerulonephritis; Kidney Diseases; Anti-Glomerular Basement Membrane Disease; Biopsy; Fibrosis.

INTRODUCTION

Anti-Basal Membrane Glomerular Disease is a type of rapidly progressive glomerulonephritis (RPGN) that occurs due to the presence of autoantibodies against the non-collagenous domain 1 of the α3 chain of type IV collagen in the glomerular basement membrane (GBM). The eponym "Goodpasture syndrome" is used in cases where both the kidneys and lungs are involved (typically presenting as pulmonary hemorrhage) simultaneously.[1]

The annual incidence of anti-MBG disease is estimated to be less than 2 cases per million inhabitants, with two incidence peaks. The first peak occurs in the third decade, characterized by a predominance of males, frequent concomitant pulmonary hemorrhage, and high levels of specific anti-GBM antibodies, but negative ANCA. The second peak occurs in the seventh decade, showing a uniform gender distribution, infrequent pulmonary hemorrhage, lower levels of anti-MBG antibodies, but frequent positivity for ANCA.[2-4]

Rapid progressive glomerulonephritis (RPGN) is defined as a decline of at least 50% in kidney function over days or weeks, accompanied by hematuria and proteinuria. It can be subdivided into three types based on histopathology and immune complex deposition. Type I corresponds to Anti-GBM Disease; Type II refers to diseases mediated by immune complex deposition; and Type III is Pauci-immune Disease, characterized by the absence of deposits and the prevalence of ANCA (anti-neutrophil cytoplasmic antibody).[1]

Anti-GBM disease can be clinically diagnosed in a patient with rapidly progressive glomerulonephritis (RPGN), showing a strong correlation with positive serum results for anti-GBM antibody tests using an enzyme-linked immunosorbent assay (ELISA). However, the diagnosis can only be confirmed through a renal biopsy demonstrating crescentic

glomerulonephritis in light microscopy (LM) associated with diffuse linear immunostaining for IgG along the glomerular basement membrane (GBM) in immunofluorescence (IF).[1]

The role of biopsy becomes even more essential in cases where serum anti-MBG antibody tests may return negative, but the diagnosis is confirmed through histopathological studies. Additionally, in centers with pathologists specialized in kidney biopsy diagnostics, histopathological evaluations often yield results more quickly than serological tests.[8]

Electron microscopy has limited additional value in diagnosing anti-GBM disease, showing nonspecific features of crescentic glomerulonephritis, including rupture of the GBM, extravascular fibrin presence, and increased cellularity. Electron-dense deposits are not observed in isolated anti-GBM disease. However, electron microscopy may be necessary to exclude concomitant glomerulopathies or to perform differential diagnosis with other diseases that may present with linear fluorescence patterns (such as fibrillary glomerulopathy and thickening of the GBM in diabetics).[1]

Patient survival and renal survival largely depend on the severity of renal dysfunction at presentation. Additionally, other predictors—such as the need for mechanical ventilation, oliguria, and 85% cellular crescents in renal biopsy, along with dialysis dependence at presentation—are among the strongest predictors of potentially fatal outcomes. The one-year survival rates for patients and renal survival after the diagnosis of anti-GBM disease have been previously reported as 73% and 25%, respectively.[10]

However, timely diagnosis, increased awareness of the disease's heterogeneity, and early initiation of intensive therapy have changed the outlook for this condition, resulting in a renal survival rate that has been twice as high since 2007. Patients with biopsy samples showing sclerotic class (≥ 50% globally sclerotic glomeruli) and those with 100% cellular crescents did not recover from dialysis dependence at presentation. In the analysis, dialysis dependence on presentation, the percentage of normal glomeruli, and the extent of interstitial infiltration were predictors of Chronic Kidney Disease (CKD) during follow-up, while only 1 in 15 patients with focal class biopsy (≥ 50% normal glomeruli) developed CKD.[8]

Additionally, it is evident that in patients with serum creatinine levels greater than 600 µmol/l at diagnosis, the formation of crescents in more than 85% of glomeruli, oliguria, and anuria, renal function is difficult to recover. Patients with Anti-MBG disease exhibiting different clinical presentations who had normal renal function at presentation showed a 71% rate of complete remission. Those who already had renal failure had a 47% rate of partial recovery, while patients who were already on hemodialysis showed a 78% treatment failure rate.[9]

There are significant gaps in our understanding of the natural history of Anti-MBG Disease, due to the rarity of the condition and the limited, unclear literature surrounding it. In this context, epidemiological, morphological, and immunophenotypic investigations of these diseases in Brazil become important, as this data can contribute to the development of prevention and treatment strategies.

Thus, considering the rarity of the disease and the gaps in the literature, this study is justified as it offers contributions regarding the epidemiological, morphological, and immunophenotypic aspects in our context. Furthermore, it may provide elements that assist in defining strategies for the diagnosis and prevention of kidney diseases in Brazil, as well as contribute to the development of research lines for specific kidney diseases based on the data obtained.

The present study aims to describe the epidemiological, morphological, and immunophenotypic characteristics of renal biopsy reports from patients with Anti-MBG Disease and to show its frequency among cases of rapidly progressive glomerulonephritis (RPGN).

METHODS

Ethical considerations

The project follows all the regulations for research involving human subjects. The proposed research was conducted with a favorable opinion from the Research Ethics Committee of Faculdade Ciências Médicas de Minas Gerais (legal opinion 6.083.702).

Study design

This is a cross-sectional, analytical observational study, in which medical reports and requests for renal biopsies from a nephropathology center were analyzed.

Study location

The data were collected from the files of a Pathological Anatomy laboratory specialized in Nephropathology, located in a Brazilian capital.

Study material

Data from histopathological reports and medical requests for renal biopsies are made available in electronic digital media. These documents refer to patients who underwent renal biopsy and whose material was sent to the Institute of Nephropathology.

Sample selection

All reports of patients who underwent biopsy between January and December 2022, with tissue samples sent to the Institute of Nephropathology, were included, provided they were diagnosed with 'Crescents Glomerulonephritis.' Reports that lacked sufficient information for the research, such as unsatisfactory samples for histopathological study, technical artifacts that hindered diagnosis, and/or inadequate clinical information, were excluded.

Epidemiological and laboratory data

Epidemiological data were collected, including sex and age, and laboratory data regarding the presence or absence of proteinuria.

Histological and immunofluorescence data

The histological data included information from the glomerular compartment (total and sclerosed glomeruli count; number of cellular, fibro cellular, and fibrous crescents), data from the vascular compartment (vascular thickness, presence or absence of parietal injury and thrombi), and data from the tubulo-interstitial compartment (degrees of fibrosis and inflammation; presence or absence of granuloma, eosinophils, and plasma cells). The immunofluorescence data included IgG, IgA, IgM, C3, C1q, fibrinogen, kappa, and lambda.

Statistical analysis

The results obtained were stored in electronic spreadsheets using the EXCEL program. To compare and analyze the relationship between qualitative and quantitative variables, the chi-square test of independence, Kruskal-Wallis test, and Fisher's exact test were used. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 124 reports of patients with RPGN were selected. Of these, 18 were diagnosed with anti-GBM disease (28%). The main findings are described according to the total number of reports diagnosed as RPGN and in a comparative manner between types 1, 2, and 3 of RPGN. The focus is on type 1 RPGN.

The main epidemiological and laboratory data are summarized in Table 1.

Table 1. Epidemiological and laboratory data of GNRP cases and most likely type.

	CRESCENT TYPE				
Characteristics	Total, N = 124[1]	Type 1, N = 18[1]	Type 2, N = 20[1]	Type 3, N = 86[1]	Value p[2]
SEX					0.029
Female	70 (56%)	5 (28%)	12 (60%)	53 (62%)	
Male	54 (44%)	13 (72%)	8 (40%)	33 (38%)	
AGE	52 (36, 66)	46 (35, 58)	38 (31, 49)	56 (41, 69)	0.019
Proteinuria					0.8
No	57 (46%)	9 (50%)	8 (40%)	40 (47%)	
Yes	67 (54%)	9 (50%)	12 (60%)	46 (53%)	

[1]n (%); Median (AIQ)
[2]Chi-square test of independence; Kruskal-Wallis test; Fisher's exact test

Of the total cases in the sample, 18 (14.52%) were diagnosed with anti-GBM disease (crescentic GN type 1), representing the smallest percentage among the analyzed cases. Most patients diagnosed with anti-GBM disease were male, accounting for 72% of the sample, with an average age of 46 years. This epidemiological profile differs from other subtypes of GN, where female patients predominate, but confirms the prevalence of males in anti-GBM disease reported in other studies. The average age was slightly lower than that found in the total number of patients with GN and lower compared to type 3.

The main characteristics found in microscopy are detailed in Tables 2 and 3.

Table 2. Main data observed in microscopy of GNRP cases and most likely type.

	CRESCENT TYPE				
Characteristics	**Total, N = 124[1]**	**Type 1, N = 18[1]**	**Type 2, N = 20[1]**	**Type 3, N = 86[1]**	**Value p[2]**
No. of glomeruli (total)	21 (14, 31)	20 (15, 28)	22 (13, 32)	21 (14, 31)	>0.9
Number of sclerosed glomeruli	4 (2, 11)	5 (0, 8)	2 (1, 4)	5 (2, 12)	0.044
No. of cellular crescents	1.0 (0.0, 3.3)	3.0 (1.0, 6.8)	1.0 (0.0, 4.8)	1.0 (0.0, 3.0)	0.15
No. of fibro cellular crescents	0.00 (0.00, 2.00)	1.00 (0.25, 2.75)	0.00 (0.00, 1.25)	0.00 (0.00, 2.00)	0.2
No. of fibrous crescents	3 (0, 8)	3 (1, 9)	1 (0, 2)	4 (1, 10)	0.001
(Percentage of Sclerotic G)	0.22 (0.08, 0.50)	0.23 (0.00, 0.39)	0.09 (0.05, 0.28)	0.23 (0.10, 0.51)	0.090
(Cellular Growth Percentage)	0.06 (0.00, 0.23)	0.15 (0.03, 0.45)	0.06 (0.00, 0.23)	0.06 (0.00, 0.15)	0.088
(Fibrocellular Growth Per)	0.00 (0.00, 0.10)	0.06 (0.00, 0.11)	0.00 (0.00, 0.05)	0.00 (0.00, 0.10)	0.062
(Perc. Fibrous Growth)	0.17 (0.00, 0.37)	0.16 (0.06, 0.33)	0.01 (0.00, 0.12)	0.22 (0.04, 0.50)	0.001
Vascular thickness					**0.016**
Markedly thickened	1 (0.8%)	0 (0%)	1 (5.0%)	0 (0%)	
Discreetly thickened	76 (61%)	7 (39%)	9 (45%)	60 (70%)	
Moderately thickened	10 (8.1%)	1 (5.6%)	2 (10%)	7 (8.1%)	
Normal	37 (30%)	10 (56%)	8 (40%)	19 (22%)	
Presence of parietal aggression (vasculitis)					**0.6**
Absent	115 (93%)	18 (100%)	18 (90%)	79 (92%)	0.15
Present	9 (7.3%)	0 (0%)	2 (10%)	7 (8.1%)	
Presence of thrombus (Thrombotic microangiopathy)					**0.3**
Absent	123 (99%)	18 (100%)	19 (95%)	86 (100%)	
Present	1 (0.8%)	0 (0%)	1 (5.0%)	0 (0%)	
Fibrosis					**0.2**
Accentuated (≥50%)	28 (23%)	8 (44%)	2 (10%)	18 (21%)	
Discreet (5-24%)	43 (35%)	5 (28%)	8 (40%)	30 (35%)	
Irrelevant (<5%)	4 (3.2%)	0 (0%)	2 (10%)	2 (2.3%)	
Moderate (25-49%)	49 (40%)	5 (28%)	8 (40%)	36 (42%)	

[1]n (%); Median (AIQ)

[2]Chi-square test of independence; Kruskal-Wallis test; Fisher's exact test.

Regarding the distribution of crescents, class I predominantly exhibited crescents within the same evolutionary stage (proliferative or sclerosing). As for vascular thickness, normal or slightly thickened vessels predominated. The degree of fibrosis was pronounced in 44% of the cases.

Figure 1. Jones's methenamine silver, 400x. Glomerulus with proliferation of the parietal epithelium and formation of a cellular crescent under light microscopy..

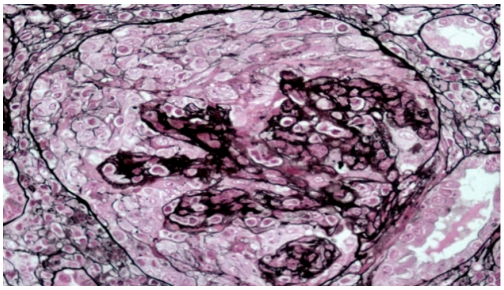

Figure 2. Cellular crescent under light microscopy

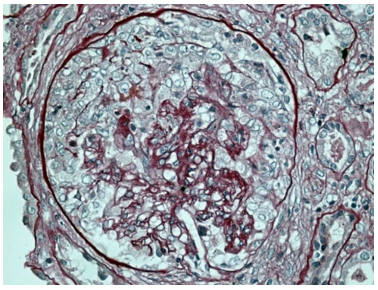

Figura 3. Cell crescent under microscopy..

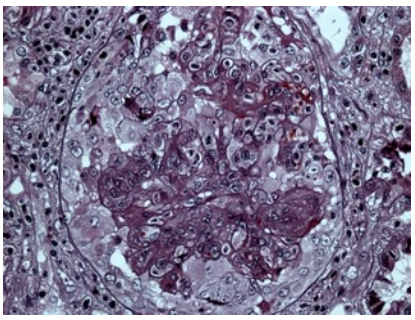

Figura 4. Fibrous crescent in the light.

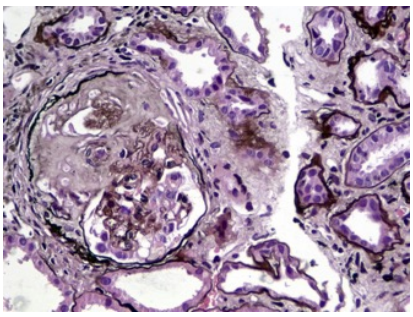

Figura 5. Positive immunofluorescence for fibrinogen in the proliferative crescent area.

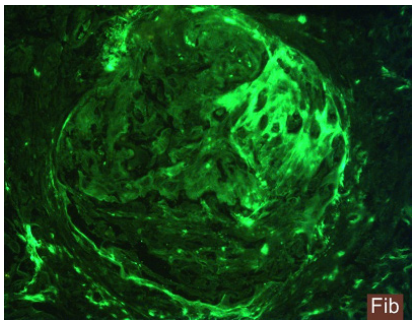

Figura 6. Linear deposition pattern

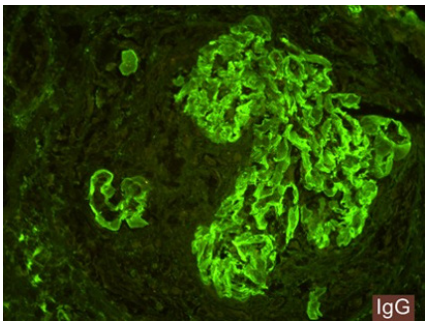

Table 3. Main data observed in microscopy, with details of the type of inflammatory response in GNRP cases and the most likely type.

	CRESCENT TYPE				
Characteristics	**Total, N = 124[1]**	**Tipo 1, N = 18[1]**	**Tipo 2, N = 20[1]**	**Tipo 3, N = 86[1]**	**Valor p[2]**
Inflammation					**<0.001**
Accentuated	10 (8.1%)	0 (0%)	18 (90%)	79 (92%)	**0.15**
Discreet	88 (71%)	5 (28%)	15 (75%)	68 (79%)	
Irrelevant	6 (4.8%)	0 (0%)	2 (10%)	4 (4.7%)	
Moderate	20 (16%)	13 (72%)	0 (0%)	7 (8.1%)	
Presence of granuloma					**0.3**
No	113 (91%)	17 (94%)	20 (100%)	76 (88%)	
Yes	11 (8.9%)	1 (5.6%)	0 (0%)	10 (12%)	
Presence of eosinophils					**>0.9**
No	121 (98%)	18 (100%)	20 (100%)	83 (97%)	
Yes	3 (2.4%)	0 (0%)	0 (0%)	3 (3.5%)	
Presence of plasma cells					**<0.001**
No	95 (77%)	18 (100%)	20 (100%)	57 (66%)	
Yes	29 (23%)	0 (0%)	0 (0%)	29 (34%)	

[1]n (%); Median (AIQ)

[2]Chi-square test of independence; Kruskal-Wallis test; Fisher's exact test.

Regarding the details of the type of inflammatory response observed, most cases of anti-GBM disease (crescentic GNRP type 1) showed a moderate inflammatory response, a profile presented by 72% of cases of this type of GNRP. The presence of eosinophils and plasma cells was observed in all 18 cases (100%), with granuloma in only one case (5.6%).

Table 4. Main data observed in immunofluorescence of GNRP cases and most likely type.

	CRESCENT TYPE				
Characteristics	**Total, N = 124[1]**	**Type 1, N = 18[1]**	**Type 2, N = 20[1]**	**Type 3, N = 86[1]**	**Value p[2]**
IgG					**<0.001**
Negative	85 (69%)	6 (33%)	10 (50%)	69 (80%)	
Positive +/3+	11 (8.9%)	0 (0%)	4 (20%)	7 (8.1%)	
Positive ++/3+	15 (12%)	7 (39%)	3 (15%)	5 (5.8%)	
Positive +++/3+	9 (7.3%)	5 (28%)	3 (15%)	1 (1.2%)	
Traits	4 (3.2%)	0 (0%)	0 (0%)	4 (4.7%)	
IgA					**<0.001**
Negative	102 (82%)	14 (78%)	8 (40%)	80 (93%)	
Positive +/3+	3 (2.4%)	0 (0%)	2 (10%)	1 (1.2%)	
Positive ++/3+	7 (5.6%)	2 (11%)	5 (25%)	0 (0%)	
Positive +++/3+	8 (6.5%)	1 (5.6%)	5 (25%)	2 (2.3%)	
Traits	4 (3.2%)	1 (5.6%)	0 (0%)	3 (3.5%)	

	CRESCENT TYPE				
Characteristics	**Total, N = 124[1]**	**Type 1, N = 18[1]**	**Type 2, N = 20[1]**	**Type 3, N = 86[1]**	**Value p[2]**
IgM					**<0.001**
Negative	88 (71%)	16 (89%)	6 (30%)	66 (77%)	
Positive +/3+	14 (11%)	0 (0%)	8 (40%)	6 (7.0%)	
Positive ++/3+	7 (5.6%)	2 (11%)	0 (0%)	5 (5.8%)	
Positive +++/3+	2 (1.6%)	0 (0%)	2 (10%)	0 (0%)	
Traits	13 (10%)	0 (0%)	4 (20%)	9 (10%)	
C3					
Negative	63 (51%)	8 (44%)	2 (10%)	53 (62%)	
Positive +/3+	20 (16%)	2 (11%)	3 (15%)	15 (17%)	
Positive ++/3+	14 (11%)	6 (33%)	3 (15%)	5 (5.8%)	
Positive +++/3+	10 (8.1%)	1 (5.6%)	8 (40%)	1 (1.2%)	
Traits	17 (14%)	1 (5.6%)	4 (20%)	12 (14%)	
C1q					**0.002**
Negative	107 (86%)	17 (94%)	11 (55%)	79 (92%)	
Positive +/3+	4 (3.2%)	0 (0%)	2 (10%)	2 (2.3%)	
Positive ++/3+	2 (1.6%)	0 (0%)	2 (10%)	0 (0%)	
Positive +++/3+	4 (3.2%)	0 (0%)	3 (15%)	1 (1.2%)	
Traits	7 (5.6%)	1 (5.6%)	2 (10%)	4 (4.7%)	
Fibrinogen					**0.11**
Negative	79 (64%)	11 (61%)	12 (60%)	56 (65%)	
Positive +/3+	11 (8.9%)	4 (22%)	3 (15%)	4 (4.7%)	
Positive ++/3+	15 (12%)	1 (5.6%)	3 (15%)	11 (13%)	
Positive +++/3+	16 (13%)	1 (5.6%)	1 (5.0%)	14 (16%)	
Traits	3 (2.4%)	1 (5.6%)	1 (5.0%)	1 (1.2%)	
Kappa					
Negative	77 (62%)	5 (28%)	5 (25%)	67 (78%)	
Positive +/3+	9 (7.3%)	0 (0%)	4 (20%)	5 (5.8%)	
Positive ++/3+	12 (9.7%)	4 (22%)	4 (20%)	4 (4.7%)	
Positive +++/3+	17 (14%)	8 (44%)	7 (35%)	2 (2.3%)	
Traits	9 (7.3%)	1 (5.6%)	0 (0%)	8 (9.3%)	
Lambda					**<0.001**
Negative	82 (66%)	5 (28%)	5 (25%)	72 (84%)	
Positive +/3+	11 (8.9%)	1 (5.6%)	5 (25%)	5 (5.8%)	
Positive ++/3+	11 (8.9%)	5 (28%)	2 (10%)	4 (4.7%)	
Positive +++/3+	15 (12%)	7 (39%)	8 (40%)	0 (0%)	
Traits	5 (4.0%)	0 (0%)	0 (0%)	5 (5.8%)	

[1]n (%); Median (AIQ)

[2]Chi-square test of independence; Kruskal-Wallis test; Fisher's exact test.

Study limitations

Although the research was conducted rigorously, some limitations inherent to the study design should be considered. The use of biopsy reports, while providing a rich source of data, may be subject to limitations regarding the availability and standardization of recorded information. Factors such as variability in how reports are filled out and potential missing or incomplete data can influence the interpretation of the results. Furthermore, since this is a retrospective study, the analysis is limited to what was previously documented, restricting direct control over the collected variables.

DISCUSSION

This study was conducted at a specialized nephropathology institute, based on the analysis of material from kidney biopsies along with the respective epidemiological and clinical-laboratory reports, which were issued by professionals experienced in Renal Pathology. The analysis of biopsies by experienced professionals is extremely important, as the most accurate diagnosis of anti-GBM disease (crescentic GN type 1) is achieved through the proper analysis of the material obtained from kidney biopsy.[7]

Regarding the epidemiological data of the sample, 14.52% of the cases of GN were diagnosed as anti-GBM disease. This proportion aligns with that described by McAdoo and Pusey. Considering age and sex, the average age was 46 years, with a higher incidence in males (72%). Retrospective studies have shown that the disease has a bimodal age distribution, with the first peak of incidence occurring in the third decade, predominantly affecting men, and a second peak in the sixth and seventh decades, impacting both men and women equally.[12]

In a study conducted with 17 patients with anti-GBM disease in India, 87.5% of the biopsies showed glomerular crescents, whereas the present study demonstrated the presence of crescents in all biopsies, with 15% being cellular, 6% fibro cellular, and 16% fibrous. Five of the Indian patients had evidence of vasculitis in the biopsy, while the current study did not identify vasculitis or thrombotic microangiopathy in any of the participants. Regarding vascular thickness, the studied sample showed 39% slightly thickened, 5.6% moderately thickened, and 56% normal. The presence of fibrosis was pronounced in 44% of the sample, moderate in 28%, and slightly in 28%; inflammation was slight in 28% and moderate in 72%. Granuloma was identified in only 5.6% of the patients. In terms of cellularity, no plasma cells or eosinophils were found in any of the biopsies.[12]

Regarding survival, Prabhakar et al. describe 100% renal and patient survival at one year for those who did not require dialysis, while among those who needed dialysis intervention at the initial presentation, survival was 85% at one year. Thus, the study concludes that dialysis-dependent renal failure results in a worse prognosis. Additionally, McAdoo et al. add that predictors of poor renal prognosis include the severity of renal dysfunction at presentation, the proportion of glomeruli affected by crescents, and oligoanuria.[2]

Considering that this is a disease with an acute and often severe course, with 60-70% of patients reaching end-stage renal disease, the importance of early treatment is evident, as 80% of patients will achieve remission, according to Ivkovic et al.[13]

Financing

During the research, costs were incurred related to materials, such as printing, and transportation expenses for travel to the laboratory. These resources were fully funded by the authors.

CONCLUSION

New scientific data has been obtained regarding the epidemiology of this rare and poorly understood disease, particularly in Brazil. The morphological pattern indicates that Anti-MBG Disease presents severe progressive cases and marked tubulointerstitial damage, necessitating prompt treatment to improve renal and overall survival.

It is noted that the lack of awareness among patients and primary healthcare professionals leads to late referrals and subsequent deterioration in clinical outcomes, highlighting the urgent need for dialysis intervention right at the time of diagnosis.

Therefore, early diagnosis and intervention are essential for a favorable outcome, requiring further studies to establish effective diagnostic parameters and criteria, as well as a better definition of appropriate treatment for each patient.

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REFERENCES

1. Markowitz GS, Radhakrishnan J, D'Agati VD. An overlapping etiology of rapidly progressive glomerulonephritis. Am J Kidney Dis. 2004;43(2):388-393.
2. McAdoo SP, Pusey CD. Anti-glomerular basement membrane disease. Clin J Am Soc Nephrol. 2017;12(7):1162-1172.
3. Shah MK, Hugghins SY. Characteristics and outcomes of patients with Goodpasture's syndrome. South Med J. 2002;95(12):1411-1418.
4. Yang R, Hellmark T, Zhao J, et al. Antigen and epitope specificity of anti-glomerular basement membrane antibodies in patients with Goodpasture disease with or without anti-neutrophil cytoplasmic antibodies. J Am Soc Nephrol. 2007;18(4):1338-1343.
5. Moulis G, Huart A, Guitard J, et al. IgA-mediated anti-glomerular basement membrane disease: an uncommon mechanism of Goodpasture's syndrome. Clin Kidney J. 2012;5:545-548.
6. Kussman A, Gohara A. Serum antibody-negative Goodpasture syndrome with delta granule pool storage deficiency and eosinophilia. Clin Kidney J. 2012;5:572-575.
7. Bomback AS. Anti-glomerular basement membrane nephritis: why we still 'need' the kidney biopsy. Nephrol Dial Transplant Plus. 2012;5(6):496-497.
8. Van Daalen EE, Jennette JC, McAdoo SP, et al. Predicting outcome in patients with anti-GBM glomerulonephritis. Clin J Am Soc Nephrol. 2018;13(1):63-72.
9. Cui Z, Zhao MH, Xin G, Wang HY. Characteristics and prognosis of Chinese patients with anti-glomerular basement membrane disease. Nephron Clin Pract. 2005;99(2):c49-c55.
10. Chen M, Cui Z, Zhao MH. ANCA-associated vasculitis and anti-GBM disease: the experience in China. Nephrol Dial Transplant. 2010;25(7):2062-2065.
11. Crensiglova C, et al. Frequency and clinical histological analysis of glomerular diseases in a tertiary hospital in southern Brazil. J Bras Nefrol. 2016;38(1):42-48.
12. Prabhakar D, Rathi M, Nada R, et al. Anti-glomerular basement membrane disease: case series from a tertiary center in North India. Indian J Nephrol. 2017;27(2):108-112. doi:10.4103/0971-4065.171227.
13. Ivković V, Bajema IM, Kronbichler A. Beyond serology: is there still a value of kidney biopsy in anti-glomerular basement membrane disease? Kidney Int Rep. 2023;8(12):2495-2498.
14. Reggiani F, L'Imperio V, Calatroni M, et al. Goodpasture syndrome and anti-glomerular basement membrane disease. Clin Exp Rheumatol. 2023;41(4):964-974. doi:10.55563/clinexprheumatol/tep3k5.
15. Hrušková Z, Tesař V. Pulmonary-renal syndrome. Vnitr Lek. 2020;66(5):56-61.

16. Segelmark M, Hellmark T. Anti-glomerular basement membrane disease: an update on subgroups, pathogenesis and therapies. Nephrol Dial Transplant. 2019;34(11):1826-1832. doi:10.1093/ndt/gfy327.
17. Asim M, Akhtar M. Epidemiology, impact, and management strategies of anti-glomerular basement membrane disease. Int J Nephrol Renovasc Dis. 2022;15:129-138. doi:10.2147/IJNRD.S326427.
18. Guo C, Ye M, Li S, Zhu TT, Rao XR. Anti-glomerular basement membrane disease with IgA nephropathy: a case report. World J Clin Cases. 2022;10(12):3916-3922. doi:10.12998/wjcc.v10.i12.3916.
19. Mami I, Ghzel E, Abida R, et al. Anti-glomerular basement membrane disease with intense nephrotic syndrome: a new case report. Pan Afr Med J. 2021;39:243. doi:10.11604/pamj.2021.39.243.30461.
20. Ge Y, Liu K, Yang G, et al. Clinicopathological characteristics and outcome predictors of anti-glomerular basement membrane glomerulonephritis. Ren Fail. 2022;44(1):2037-2045. doi:10.1080/0886022X.2022.2147673.
21. Marques C, Carvelli J, Biard L, et al. Prognostic factors in anti-glomerular basement membrane disease: a multicenter study of 119 patients. Front Immunol. 2019;10:1665. doi:10.3389/fimmu.2019.01665.
22. Yamashita M, Takayasu M, Maruyama H, Hirayama K. The immunobiological agents for treatment of antiglomerular basement membrane disease. Medicina (Kaunas). 2023;59(11):2014. doi:10.3390/medicina59112014.
23. Fouhy F, Mayer N, Burke L, O'Shaughnessy M. Antiglomerular basement membrane (anti-GBM) disease with clinical and histological features that bridge the typical to atypical spectrum. BMJ Case Rep. 2021;14(7):e241883. doi:10.1136/bcr-2021-241883.
24. Kiani R, Shahid M. Anti-glomerular basement membrane (anti-GBM) disease: effect of early diagnosis and treatment on prognosis. S D Med. 2020;73(5):208-211.
25. Zhong Z, Tan J, Tang Y, et al. Goodpasture syndrome manifesting as nephrotic-range proteinuria with anti-glomerular basement membrane antibody seronegativity: a case report. Medicine (Baltimore). 2020;99(39):e22341. doi:10.1097/MD.0000000000022341.
26. Peyton N, Rastogi P. Educational case: necrotizing and crescentic glomerulonephritis with anti-glomerular basement membrane antibodies (anti-GBM). Acad Pathol. 2020;7:2374289520975166. doi:10.1177/2374289520975166.
27. Nikolopoulou A, Huang-Doran I, McAdoo SP, et al. Membranous glomerulonephritis with crescents. Kidney Int Rep. 2019;4(11):1577-1584. doi:10.1016/j.ekir.2019.07.021.
28. Ivković V, Kronbichler A, Caza TN. "Atypical" anti-GBM disease: just atypical, or not anti-GBM disease at all? Am J Kidney Dis. 2024;84(1):127-129. doi:10.1053/j.ajkd.2024.02.011.
29. Anguiano L, Kain R, Anders HJ. The glomerular crescent: triggers, evolution, resolution, and implications for therapy. Curr Opin Nephrol Hypertens. 2020;29(3):302-309. doi:10.1097/MNH.0000000000000596.
30. Salama AD. IgA vasculitis and anti-GBM disease: two ends of a spectrum of immune complex vasculitis. Rheumatology (Oxford). 2020;59(Suppl 3):iii118-iii122. doi:10.1093/rheumatology/kez540.

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