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Original investigation

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Primary glomerulonephritis in children attending a Referral Center in the Colombian Caribbean Region

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Summary

Introduction: Primary glomerulonephritis are diseases that affect the structure and function of the glomerulus. For proliferative glomerulopathies, it has been observed that for IgA and IgM mesangial GN, they are the ones that mostly evolve to end-stage renal failure, followed by membranous-proliferative or mesangiocapillar GN. The clinical manifestation of GN is the result of the combination of hematuria, proteinuria and the presence of acute or chronic renal failure.

Material and methods: Medical records were reviewed. They were collected in a database of all biopsies performed from 2008 to 2014. An χ^2 was used to establish associations between variables ($\alpha = 95\%$). For the differences among proportions Student's t or U-Mann-Whitney were used.

Results: 146 (88%) patients who had complete data were selected. The mean age was 8 ± 4 years old for both sexes. No significant difference was found between gender by age ($p \geq 0.05$), nor was there an association between gender and age ($p \geq 0.05$). The predominant NGs with the highest prevalence were Proliferative Mesangial and IgA Nephropathy. NGs by Thin Basal Membrane, Nephropathy by C3 and Cq were not present in male patients. The most prevalent syndromic picture was the Nephrotic Syndrome (58%).

Conclusions: The existence of this registry of renal biopsies is the basis for the creation of the Registry of Glomerulopathies in children in Colombia, whose data are necessary to establish programs for the treatment and prevention of glomerular diseases in our country in order to decrease its progression.

Key words: Glomerulonephritis, children, proteinuria, hematuria.

Glomerulonefritis primarias en niños que asisten a un Centro de Referencia en la Región Caribe colombiana

Resumen

Introducción: Las glomerulonefritis (GN) primarias son enfermedades que afectan a la estructura y función del glomérulo. Dentro de las glomerulopatías proliferativas se ha observado que la GN mesangial por IgA e IgM, son las que evolucionan con mayor frecuencia a la insuficiencia renal permanente; seguida de la

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GN membrano-proliferativa o mesangiocapilar. La presentación clínica de la GN incluye hematuria, proteinuria e insuficiencia renal aguda o crónica.

Material y métodos: Se revisaron las historias clínicas y se acopiaron en una base de datos todas las biopsias realizadas entre los años 2008 a 2014. Se realizó un χ^2, para establecer las asociaciones entre variables ($\alpha = 95\%$) y para las diferencias entre proporciones se utilizó t de Studentó U- Mann-Whitney.

Resultados: Se seleccionaron 146 pacientes (88% del total analizado) que tenían los datos completos. La edad promedio fue de 8±4 años para ambos sexos. No se encontraron diferencias significativasni asociaciones entre el sexo y la edad ($p \geq 0,05$). Las GN predominantes fueron las proliferativa mesangial y la nefropatía por IgA. Las GN por membrana basal delgada, nefropatía por C3 y C4 q no se presentaron en varones. La presentación clínica más frecuente fue el Síndrome Nefrótico (58%).

Conclusiones: Los hallazgos de éste registro de biopsias renales podrían ser la base para la creación de un Registro de Glomerulopatías en niños en Colombia, instrumento necesario para establecer programas de tratamiento y prevención de las enfermedades glomerulares en nuestro país a fin de disminuir su progresión.

Palabras clave: glomerulonefritis, niños, proteinuria, hematuria.

INTRODUCTION

Primary glomerulonephritis is a medical technical term used to designate diseases that affect the structure and function of the glomeruli, although the other components of the nephrons may later be involved. Its etiology is unknown in most cases and is not secondary to known systemic processes, it is confined to the kidney (1). The clear majority of this is immunology-based, the triggering factor is unknown, and therefore this is a very important factor in the genesis of the disease. Genetic factors make an individual vulnerable.

Etiologically, glomerulopathies are divided into Proliferative (Endocapillary, Mesangial proliferative, Membrano-proliferative and Epithelial Proliferation) and Non-proliferative (Minimal change, Focal segmental sclerosis, Membranous and Mild Mesangial) (1,2).

For proliferative glomerulopathies, it has been observed, epidemiologically, that for IgA and IgM mesangial GN, 15-40% of children evolve to end-stage renal failure; For the membrano-proliferative or mesangiocapillar GN, approximately 80% of the cases evolve to chronic renal failure (CRF), and diffuse endocapillary glomerulonephritis, the most frequent at pediatric age, being the Acute Nephritic Syndrome (ANS) its clinical presentation, usually has a good prognosis. Contrary to this, both in frequency and prognosis, we have extracapillary glomerulonephritis, also known as rapidly progressive glomerulonephritis, with a 75% mortality or ending on dialysis at 2 years of evolution (3-5).

The clinical manifestation of glomerulopathies is the result of the combination of hematuria (microscopic or macroscopic), proteinuria (nephrotic range or not) and the presence of acute or chronic renal failure. All of these can be associated with high blood pressure. In the case of non-proliferative glomerulopathies, GN of minimal change is the most frequent cause of nephrotic syndrome in children, however, its prognosis is good in most patients. Regarding the focal segmental GN, which is the second most frequent type observed in the nephrotic syndrome, 50% evolve to a CRF; for Membranous or extramembranous GN, which is unusual in children, accounts for less than 10% of all primary glomerulopathies and is not accompanied by renal failure (3,4).

Given the previous clinical manifestation, this is divided into the following syndromic conditions: Asymptomatic urinary disorders, including hematuria (macro and microscopic), as well as nephrotic and nephritic syndromes. The objective of the present research was to characterize clinically and epidemiologically the primary GN in children who underwent biopsies in a Referral center of the Colombian Caribbean region.

MATERIALS AND METHODS

The information was collected from the medical records at NefroRed, after authorization from the Ethics Committee of the Referral Center. All patients were maximum 15 years old, had undergone biopsy between 2008 and 2014, and presented a picture of primary GN, with a later confirmation by the Department of Pathology of the Center.

The study was descriptive, cross-sectional, the information was collected in the city of Barranquilla (Atl. - Col). However, it should be noted that the geographical location of the collection center made it possible to collect samples from the entire Colombian Caribbean region, given this is the referral center of the area.

A database of all biopsies performed from 2008 to 2014 was designed. The variables that were considered in the present report were Department of Origin, Age, Sex, Time of Evolution and Syndromic picture. The measures of central tendency and χ^2 test were calculated to establish the main associations if there were any ($\alpha = 95\%$). To establish possible differences between proportions the Student's t or U-Mann-Whitney- were used. The data were analyzed with R (6).

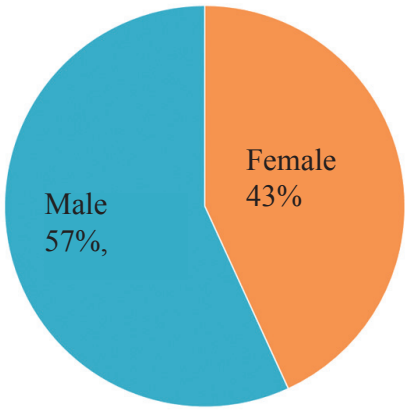
RESULTS

A total of 165 clinical records were reviewed, of which 146 patients (88% of the population) were selected, since only those had histological diagnosis, age, sex and origin information. Likewise, only patients who had residence in the Colombian Caribbean Region were considered.

The relationship between sexes was of (3) women for every four (4) men. Given the size of the population, a proportionally significant difference was found between sexes. The male had a higher prevalence than the female ($t = 2.4$, p-value <0.05, $\alpha = 95\%$).

The geographical location of the Clinic allowed a greater influx of patients from the same Department, over 64% of them. However, there were patients from all other departments of the Colombian Caribbean Region. It is noteworthy the presence of patients from the Insular region of the Colombian Caribbean, in this case, San Andrés and Providencia, with a representation of 1%.

Figure 1.
Circular graphicof distribution by sex. Source: 2008- 2014 Research data.



For the 88 children and 63 girls, the mean age was 8 ± 4 years for both sexes, the maximum age reported was 15 years. When comparing sex ratio by age, no significant difference was found between sexes ($t = 0.31$, p-value ≥ 0.05, $\alpha = 95\%$), nor was there an association between sex and age ($\chi^2 = 2.21$, p-value ≥ 0.05, $\alpha = 95\%$).

The predominant NGs with the highest prevalence were Mesangial Proliferative GN and IgA Nephropathy. 50.79% of the girls and 55.42 of the boys were affected by Mesangial proliferative GN, while IgA nephropathy affected 22% of the girls and 21% of the boys included in the study.

GNs like Thin Basement Membrane Disease, C3 and C4q Nephropathy were not present in male patients. Mesangial proliferative GN and IgM nephropathy were present in a greater proportion for the male gender. However, when comparing the ratio of sex and each GN, no significant difference was found ($W = -6.0$, p-value $= 0.05$, $\alpha = 95\%$). No association was found between sex and GN ($\chi^2 = 8.53$, p-value ≥ 0.05, $\alpha = 95\%$).

Figure 2.

Bar graphic of the distribution by Department of Origin. Source: 2008- 2014 Research data.

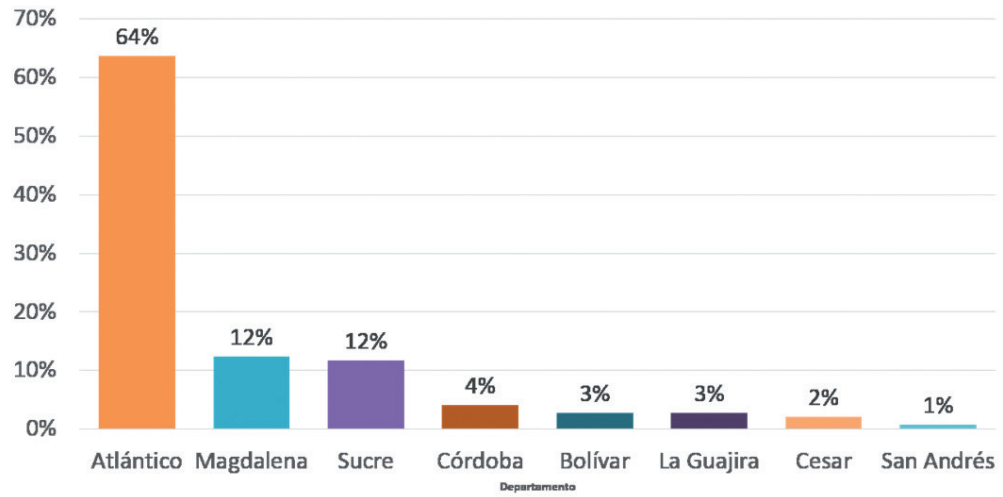


Figure 3.

Distribution of patients by Stages of Development.

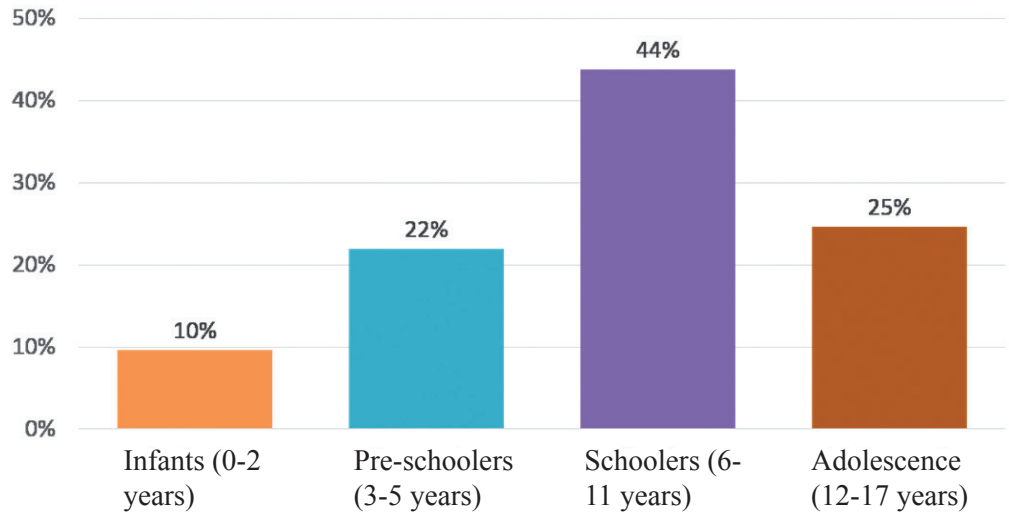


Figure 4.

Distribution of GNs Source: 2008- 2014 Research data.

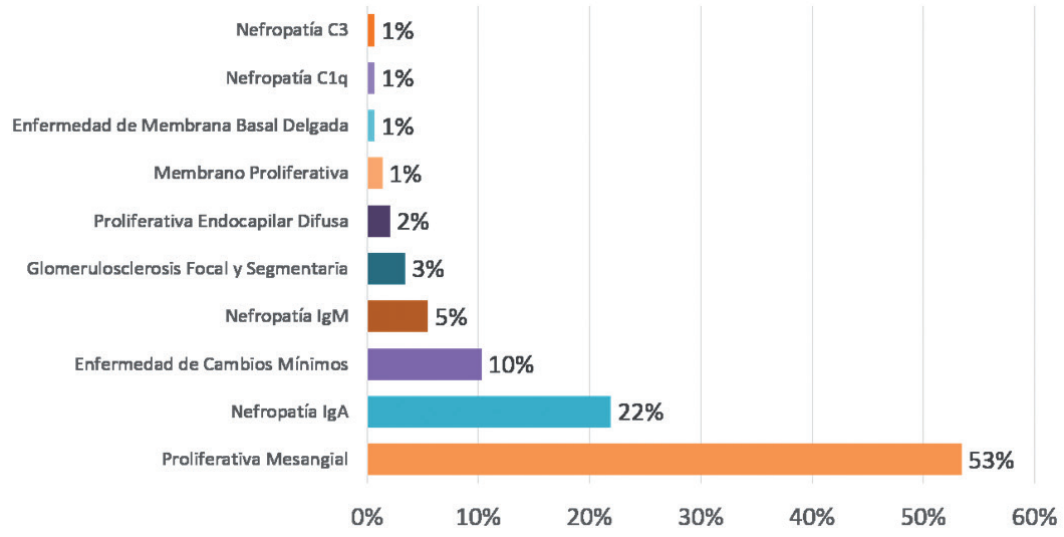
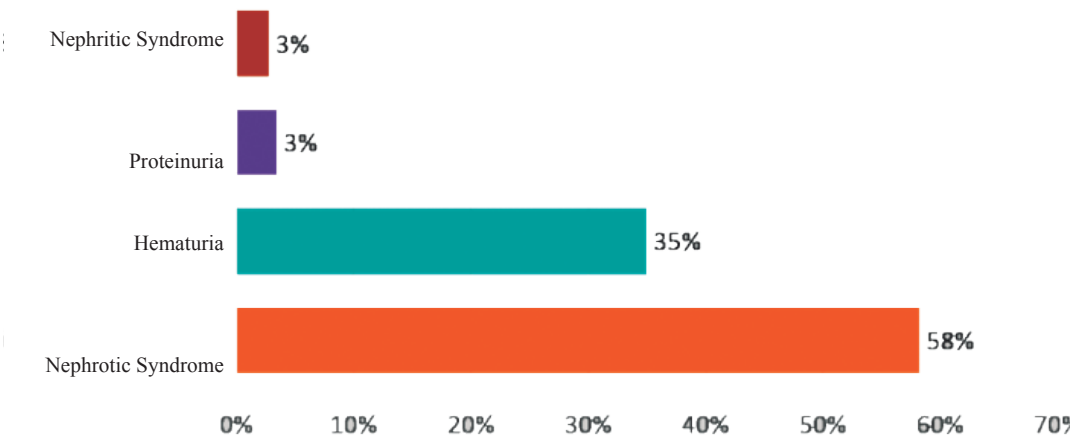


Figure 5.

Distribution of Syndromic PictureSource: 2008- 2014 Research data.



The most prevalent syndromic picture was Nephrotic Syndrome (58%), followed by Hematuria (35%). 59.04% (49 of 83) of the girls and 57.14% (24 of 63) of the children presented the main syndromic picture, while hematuria manifested in 32.4% (27 of 83) of girls and 38.1% (24 of 63) of the children included in the study.

The Nephritic Syndrome and Renal Failure were only present in male patients. The syndromic pictures of Hematuria and Proteinuria were present for

female patients in a greater proportion. However, when comparing sex ratio for each of the syndromic pictures, no significant difference was found (t = 0.0, p-value ≥0.05, α = 95%). When searching for a possible association between sex and syndromic picture, the results were statistically non-significant (χ^2 = 4.173, p-value ≥0.05, α = 95%).

DISCUSSION

Glomerulopathies are diseases with great incidence in our environment, where the most frequent age group is the pediatric population (7). Of the primary glomerulopathies with respect to age the most characterized are the diffuse endocapillary glomerulonephritis whose age of presentation is 4-15 years and the minimal change disease from 1 to 4 years (8). The other primary glomerulopathies are present in the pediatric age with no predilection for a specific group (5,9). Our records of patients whose average age was 8 years weresimilar to the facts found in international registries. In addition, the male sex was the most compromised one in our study, similar to what was found in the literature.

The incidence of glomerulopathies in our environment are different from international statistics. While IgA glomerulopathy predominates in the world (10,11), in our setting it occupies second place, with a very dissimilar proportion, whereas mesangial proliferative glomerulopathy, not very frequent in the pediatric age (12,13) in our environment, behaved as the most frequent, with a statistically significant difference.

The syndromic pictures were almost similar to those observed in other studies (14). The nephrotic syndrome was the main clinical picture with which majorities of the glomerulopathies in our environment debuted (hematuria in some series of cases is the main clinical alteration). On the other hand, hematuria and isolated proteinuria occupied the second and third place. Although not part of our study, we did not neglect the important incidence of lupus nephropathy. The small proportion of nephritic syndrome in our series of cases is striking, and it is, therefore, consistent with the idea that this is because the same benign course of the disease requires the non-performing of renal biopsy.

There were no significant statistical differences regarding the age of presentation, sex and syndromic picture. The most striking aspect of our study was the prevalence of membrano-proliferative glomerulopathies, with a very wide difference with respect to the others and with what was found in the international arena. As a very frequent primary glomerulopathy, emphasizing in the study of this would be very useful in subsequent researches.

It is very noteworthy that, although minimal change disease and diffuse proliferative endocapillary disease are so frequent in pediatrics, there was a low report of them. This tendency is explained by the non-biopsy of the same due to the benign course of the disease. We also encourage the analysis of lupus nephropathy in later studies. The existence of this registry of kidney biopsies may be the basis for the creation of the Registry of Glomerulopathies in Children in Colombia, whose data are necessary to establish programs for the treatment and prevention of glomerular diseases in our country in order to decrease their progression to the terminal stage.

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