Renal Biopsy Findings in Jamaican Children
M Miller¹, M Gooden¹, D Shah², AK Soyibo³,⁴, J Williams⁵, EN Barton³,⁴

ABSTRACT

Objective: To document the histological findings in Jamaican children undergoing renal biopsy in order to determine the relative prevalence of varying types of glomerular disease in the island.

Methods: This study analyses retrospectively the renal histology in all Jamaican children less than age 12 years undergoing their first adequate renal biopsy between January 1985 and December 2008. Clinicopathological data were obtained solely from the histology reports from the University Hospital of the West Indies where all paediatric renal biopsies are processed.

Results: Of the 270 children, aged 1 month to 11 years (mean 7.58 years), 147 [58.1%] were males. The commonest indications for renal biopsy were nephrotic syndrome (57.4%) and glomerulonephritis (30%). Most biopsied children (260/270) had glomerular disease. The predominant glomerulonephritides were diffuse proliferative glomerulonephritis (DPGN) (27.7%) and mesangial proliferative glomerulonephritis (MesGN) (25.5%). Glomerular disease was idiopathic in 136/260 (53%) but was infection-associated in 32.3% (84 cases) of which Poststreptococcal glomerulonephritis (PSGN) was the commonest (75%) – predominantly DPGN (74.6%). Hepatitis B followed at 15.5% (13/84) manifested as membranous nephropathy in 83.3% (10/12). In patients with SS disease, DPGN was the commonest histology (47.4%). Systemic lupus erythematosus accounted for 5% of all renal biopsies. Over time, PSGN occurred less frequently, with a parallel reduction in DPGN and MesGN.

Conclusion: In Jamaican children, DPGN is the commonest nephritis. Membranous nephropathy is primarily due to Hepatitis B. The commonest histology in SS disease is DPGN. The role of infection in the pathogenesis of renal disease in Jamaican children is probably underestimated.

Key words: glomerulonephritis, haematuria, renal histology

Hallazgos en las Biopsias Renales en Niños Jamaicanos
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RESUMEN

Objetivo: Documentar los hallazgos histológicos en niños jamaicanos a los que se les ha realizado biopsias renales para determinar la prevalencia relativa de los diversos tipos de enfermedad glomerular en la isla.

Métodos: Este estudio analiza retrospectivamente la histología renal en todos los niños jamaicanos menores de 12 años sometidos a su primera biopsia renal adecuada entre enero de 1985 y diciembre de 2008. Los datos clinicopatológicos fueron obtenidos exclusivamente de los reportes de histología del Hospital Universitario de West Indies, dónde se procesan todas las biopsias renales.

Resultados: De 270 niños, cuyas edades fluctuaban de 1 mes a 11 años (media 7.58 años), 147 [58.1%] eran varones. Las indicaciones más comunes para la biopsia renal fueron el síndrome nefrótico (57.4%) y la glomerulonefritis (30%). La mayoría de los niños sometidos a biopsia (260/270) tenían la enfermedad del glomerular. Las glomerulonefritides predominantes fueron la glomerulonefritis proliferativa difusa (GNPD) (27.7%) y glomerulonefritis proliferativa mesangial (GNMes) (25.5%). La enfermedad glomerular fue idiomatica en 136/260 (53%) pero estuvo asociada con infecciones en...
INTRODUCTION

There are no comprehensive reviews of renal histology in Caribbean children. Earlier studies of renal biopsy findings in Jamaican children with nephrotic syndrome (1,2) found mesangial proliferative glomerulonephritis (MesGN) to be more common than minimal change disease (MCD) while in Trinidadian children MCD predominated (3).

Isolated reports (1,2,4–6) attest to the contribution of post-infectious nephritis to the spectrum of renal disease – more specifically nephrotic syndrome – in Jamaican children. In Jamaica, Paediatric Nephrology services are offered at the University Hospital of the West Indies (UHWI) and Bustamante Children’s Hospital (BCH) and all renal biopsies are processed by the Pathology Department of the UHWI. The data presented in this paper therefore completely represent the histological pattern of renal disease in Jamaican children.

The purpose of this study was to document the histological appearances in all first adequate renal biopsies performed in Jamaican children less than 12 years of age between January 1985 and December 2008 in order to determine the relative prevalence of varying types of glomerular disease in the island. Where possible, clinicopathological correlations were made to enable reasonable predictions of pathology when immediate renal biopsy is unfeasible and empiric therapy necessary.

SUBJECTS AND METHODS

The study was a retrospective review of the histology reports of all renal biopsies performed in Jamaican children < less than 12 years of age, between January 1985 and December 2008. The study was approved by the University Hospital of the West Indies, University of the West Indies, Faculty of Medical Sciences (UHWI/UWI/FMS) Ethics committee. Clinical data were obtained solely from the information provided on the pathology request forms. The primary indications recorded for renal biopsy were: nephrotic syndrome, glomerulonephritis, prolonged acute, severe or chronic renal failure, autoimmune disease, heavy proteinuria and recurrent gross haematuria.

RESULTS

Between January 1985 and December 2008, 270 children had adequate first renal biopsies. In the 264 children in whom age-related data were available, the ages ranged between 1 month and 11 years (mean 7.58 ± 3.24 years). All biopsies had light microscopy but only 99 (36.7%) were subjected to electron microscopy (EM) and 57 (21.1%) to immuno-
fluorescence. There were 147 males (58.1%) and 123 females (M: F 1.2:1). The commonest indication for renal biopsy was the nephrotic syndrome (NS) [57.4%] followed by glomerulonephritis (GN) [30%] (Table 1).

Table 1: Indications for renal biopsy in Jamaican children

<table>
<thead>
<tr>
<th>Indication</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nephrotic syndrome</td>
<td>157</td>
<td>58.1</td>
</tr>
<tr>
<td>Glomerulonephritis</td>
<td>81</td>
<td>30</td>
</tr>
<tr>
<td>Recurrent gross haematuria</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Autoimmune for staging (no clinical nephritis)</td>
<td>7</td>
<td>2.6</td>
</tr>
<tr>
<td>Acute renal failure</td>
<td>5</td>
<td>1.8</td>
</tr>
<tr>
<td>Chronic renal failure</td>
<td>4</td>
<td>1.5</td>
</tr>
<tr>
<td>Hypertension</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>270</strong></td>
<td><strong>100</strong></td>
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</tbody>
</table>

**Renal histology** (Table 2). Glomerular disease (260 cases) accounted for the majority of renal pathology (96.3%). Non-glomerular disease (3.7%) consisted of interstitial nephritis in 4 children (one of whom had systemic lupus erythematosus), acute tubular necrosis (2 cases) and one case each of Wilms tumour, autosomal recessive polycystic kidney disease, amyloidosis and cortical scarring. The two commonest histological patterns in the study were diffuse proliferative glomerulonephritis (DPGN) [27.7%] and mesangial proliferative glomerulonephritis (MesGN) [25.5%] (Table 2). Membranoproliferative glomerulonephritis (MPGN) was seen in 13 cases (4.8%): [Type I (10 cases) and Type III (three cases)]. There was no Type II MPGN. Twelve patients had membranous nephropathy (MN) which was secondary to Hepatitis B infection in 10 cases (83.3%). Thirteen children had systemic lupus erythematosus (SLE) nephritis of which the commonest histology was Class 1 (36%) followed by Classes II and IV (22% and 21% respectively). Of the 157 children biopsied because of nephrotic syndrome, the commonest histology overall was MesGN 49/157 (31%). The data on nephrotic syndrome are presented separately.

**Histology in infection**: The commonest histology in infection was DPGN seen in 50/84 (59.5%) cases. In PSGN, DPGN accounted for 74.6% (47/63), followed by MesGN in 11.1% (7/63). Minimal change, focal sclerosis, chronic sclerosis, sickle nephropathy and MPGN I were also seen. Most patients with Hepatitis B renal disease had membranous nephropathy (83.3%), but MCNS, MPGN III were also noted. One patient with SLE Class IV was also Hepatitis B positive. Histology in 25 cases of AGN of uncertain cause again showed a predominance of DPGN (44% – 11/25) followed by MesGN (36%). Crescentic nephropathy was seen in 2 patients and MPGN I, MPGN III and FSGS in one patient each.

**Aetiology of glomerulonephritis**: Of the 260 patients with glomerular disease, nephritis was idiopathic in 53% (136 patients). In the remaining 122 children, glomerular disease was associated with infection in 84 (32.4%), sickle haemoglobinopathy in 25 (9.6%) and SLE in 13 (5%). Poststreptococcal glomerulonephritis was the commonest infection-related GN, 75% (63/84) followed by Hepatitis B, 15.4% (13 cases), HTLV 1 (3 cases), CMV and parvovirus infection (2 cases each) and mumps (1 case). Parvovirus testing was only performed in two sicklers whose nephrotic syndrome followed an aplastic crisis. Over the 24-year period of observation, the frequency of PSGN peaked in 1985–1988 and again in 1993–1995 with a corresponding trend in the frequency of DPGN and MesGN (Fig. 1).

<table>
<thead>
<tr>
<th>Year of study</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985–1988</td>
<td>20</td>
</tr>
<tr>
<td>1989–1992</td>
<td>15</td>
</tr>
<tr>
<td>1993–1996</td>
<td>12</td>
</tr>
<tr>
<td>1997–2000</td>
<td>5</td>
</tr>
<tr>
<td>2001–2004</td>
<td>3</td>
</tr>
<tr>
<td>2005–2008</td>
<td>2</td>
</tr>
</tbody>
</table>

Figure: Changing patterns of childhood glomerular disease with time

DPGN – diffuse proliferative glomerulonephritis; MesGN – mesangial proliferative glomerulonephritis; PSGN – Poststreptococcal glomerulonephritis
**Histology in sickle haemoglobinopathy:** 25 patients had sickle haemoglobinopathy of whom 19 had homozygous sickle cell (SS) disease, 2 had Sβ Thalassaemia and 4 had sickle cell trait (AS). All patients with sickle haemoglobinopathy presented with either atypical glomerulonephritis or nephrotic syndrome. In SS disease, DPGN was the commonest histology observed (47.4%), followed by MPGN 1 (hypocomplementaemic) and MesGN (3 cases each), FSGS and minimal change (2 cases each). There was no statistically significant difference between the frequency of DPGN, PSGN and MesGN in the children with SS disease and the overall study group.

**Recurrent gross haematuria:** Eleven patients were biopsied because of recurrent unexplained gross haematuria in the absence of clinical features of glomerulonephritis. MesGN was the commonest histology observed (5/11). IgA nephropathy was only confirmed in 2 cases, the remainder were normal (2) or had focal global sclerosis or resolving DPGN (1 each).

**DISCUSSION**

Meaningful comparison between studies of paediatric renal disease is complicated by differences in the definition of childhood. It was considered less than age 12 years in the present series but up to 19 years in others (7–9). Nephrotic syndrome was the commonest reason for renal biopsy in children from Jamaica as was also observed in Saudi Arabia [77%] (8). Glomerular disease was more frequently an indication for renal biopsy than non-glomerular disease in the present study as it was in Saudi Arabia (8) and Korea (7).

Overall, the most prevalent histology in biopsy specimens was DPGN (27.7%) followed by MesGN (25.5%). This is unusual and the frequency of these histological appearances parallels the overall frequency of PSGN (23.3%). It is known that PSGN follows a path from an acute diffuse proliferative phase to mesangial proliferation and either resolution or focal sclerosis (10). All such patterns were seen in this reported population with DPGN being the commonest histology observed in PSGN (74.6%). It is uncertain how many of those children presenting with MesGN or focal sclerosis may have had previous PSGN, which by the time of referral after a failed course of steroids would have no acute serological parameters for confirmation. DPGN is rarely documented in international paediatric series – 0.6% in Chinese children (9) – and was not mentioned at all in the series from Korea (7).

In the present series, lupus nephritis accounted for only 5.2% of glomerular disease, but in Hong Kong where patients up to age 19 years were included (9), it is the predominant nephritis (23%) followed by MCD (14%) while in Korea (7) MCD is the commonest (24.8%). IgA and Henoch Schonlein Purpura nephropathy are common in Hong Kong (9) and Korea (7) [10–13%] but were confirmed only in 1.5% of Jamaican cases. A contributory factor to this is likely to be the limited availability of immunofluorescence, as children presenting clinically with IgA nephropathy demonstrated, by light microscopy, mesangial changes which could have been compatible with the diagnosis.

Glomerulonephritis was secondary in 47% of children. It was associated with infection in 32.3%, sickle haemoglobinopathy in 9.6%, SLE in 5% and amyloidosis in one case. The commonest infections were streptococcal (75%) and Hepatitis B (15.4%), although other viruses were represented. Infection as a cause of renal disease is more a feature of developing than developed countries – for example in Nigeria (1977–1981) Hepatitis B and malarial nephropathy accounted for about 51% of cases of nephrotic syndrome (11).

The literature on glomerular pathology in sickle cell disease in childhood is sparse. Tejani et al (12) and Elfenbein et al (13) describe focal sclerosis, diffuse proliferative nephritis, mesangial proliferation and glomerular basement membrane splitting in children with sickle haemoglobinopathy, proteinuria and nephrotic syndrome. In the present series, Jamaican children with sickle haemoglobinopathy had predominantly DPGN and the pattern of glomerular disease in sicklers was similar to that in nonsicklers. We suggest that in Jamaican children less than 12 years old with sickle haemoglobinopathy, glomerular disease is likely secondary to the renal pathology common to the island’s population – ie either infection mediated or idiopathic rather than due to sickle related pathology. Further study is required.

In summary, in Jamaican children, DPGN is the commonest nephritis and may be largely infection related. Membranous nephropathy is primarily due to Hepatitis B. IgA nephropathy is seen and may be under-diagnosed. The commonest histology in SS disease is DPGN. The role of infection in the pathogenesis of renal disease in Jamaican children is probably underestimated.

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**REFERENCES**


