Original Article

Clinico-Pathological Characteristics of Children with IgA Nephropathy in a Tertiary-Level Hospital

Nahar S[1], Huque SS[2], Morshed J[3], Santa SM[4], Parveen S[5], Islam MR[6], Mamun MHA[7], Helal MA[8], Hasan MS[9], Khan AR[10], Rahman MA[11]

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ABSTRACT:

Background: *IgA nephropathy (IgAN) is the most common primary glomerulonephritis in children, characterized by mesangial IgA deposition and variable clinical severity of the disease. Limited data from developing countries like Bangladesh, highlight the need to understand their clinicopathological patterns for early diagnosis and prognosis. This study aimed to describe the clinical and histopathological characteristics of Paediatric IgAN using the Oxford MEST-C classification.*

Methods: *A cross-sectional observational study was conducted at the Department of Paediatric Nephrology, Bangladesh Medical University (BMU), Dhaka, Bangladesh, from May 2024 to April 2025. Thirty-five children (< 18 years) with biopsy-proven IgAN were included in the study. Clinical and laboratory data were recorded at presentation and renal biopsies were analyzed according to the Oxford MEST-C criteria. Data were analyzed using SPSS v25.0.*

Results: *The mean age was 10.61 ± 3.78 years; 42.9% were 6–10 years and 51.4% were 11–18 years. Proteinuria (54.3%), hematuria (42.9%) and edema (40.0%) were the predominant clinical findings, whereas 17.1% of patients had hypertension and 11.4% required dialysis. The median serum creatinine level was 0.63 mg/dL (IQR 0.355–0.84). Histopathology revealed M1 in 57.1%, E1 in 25.7%, S1 in 34.3%, T1/T2 in 8.6% and crescents in 11.4% of the cases.*

Conclusion: *Paediatric IgAN in Bangladesh predominantly affects school-aged children and commonly exhibits mesangial hypercellularity and segmental sclerosis. The Oxford MEST-C classification provides valuable prognostic insights, emphasizing the need for early biopsy evaluation and tailored management strategies to improve long-term outcomes.*

Key Words: Paediatric IgA nephropathy, Oxford classification, mesangial hypercellularity, Bangladesh.

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Authors:

1. Shamsun Nahar, Assistant Professor, Department of Paediatric Nephrology, Bangladesh Medical University, Dhaka, Bangladesh
2. Syed Saimul Huque, Associate professor, Department of Paediatric Nephrology, Bangladesh Medical University, Dhaka, Bangladesh
3. Jesmeen Morshed, Associate Professor, Department of Paediatrics, Bangladesh Medical University, Dhaka, Bangladesh
4. Samina Masud Santa, Assistant Professor, Department of Paediatric Nephrology, Bangladesh Medical University, Dhaka, Bangladesh
5. Shohely Parveen, Associate Professor, Department of Paediatrics, Bangladesh Medical University, Dhaka, Bangladesh
6. Md Ridwanul Islam, Associate Professor, Department of Paediatrics, Bangladesh Medical University, Dhaka, Bangladesh
7. Mohammad Hafiz Al-Mamun, Assistant Professor, Department of Paediatrics, Bangladesh Medical University, Dhaka, Bangladesh
8. Md. Al Helal, Assistant Professor, Department of Paediatrics, Bangladesh Medical University, Dhaka, Bangladesh
9. Muhammad Shariful Hasan, Associate Professor, Department of Paediatric Gastroenterology and Nutrition, Bangladesh Medical University, Dhaka, Bangladesh
10. Ashiqur Rahman Khan, Associate Professor, Department of Medicine, Shaheed Suhrawardy Medical College, Dhaka, Bangladesh
11. Md. Atiar Rahman, Professor, Department of Paediatric Pulmonology, Bangladesh Medical University, Dhaka, Bangladesh

Correspondence:
Dr Shamsun Nahar, Assistant Professor, Department of Paediatric Nephrology, Bangladesh Medical University, Dhaka, Bangladesh.
Email: shantabm8@gmail.com; Mobile: 01850141414

Introduction

Immunoglobulin A nephropathy (IgAN) is recognized as the most common primary glomerulonephritis in children and adults worldwide, characterized by mesangial deposition of IgA-containing immune complexes within the glomeruli [1,2]. The disease demonstrates considerable heterogeneity in its clinical manifestations, ranging from asymptomatic microscopic hematuria to progressive renal failure [3]. Although the pathogenesis of IgAN remains incompletely understood, aberrant glycosylation of IgA1 and the formation of autoantibodies against galactose-deficient IgA1 have been proposed as key mechanisms driving mesangial injury and complement activation [4].

In paediatric populations, IgAN is of particular concern because its presentation, histopathology and prognosis differ from those observed in adults. Studies have shown that children typically present with gross hematuria following upper respiratory infections, but the disease may also manifest insidiously with proteinuria or hypertension [5,6]. Despite this, data from low- and middle-income countries—especially South Asia—remain scarce. Bangladesh, like many developing nations, lacks large-scale paediatric renal biopsy registries, limiting epidemiological insight into the regional spectrum of glomerular disease.

Histopathological evaluation using the Oxford MEST-C classification has become the cornerstone of IgAN assessment. This system evaluates mesangial hypercellularity (M), endocapillary hypercellularity (E), segmental sclerosis (S), tubular atrophy/interstitial fibrosis (T) and crescents (C). Several studies have validated its prognostic relevance in both adult and paediatric cohorts [7,8]. Mesangial hypercellularity and segmental sclerosis have been particularly associated with long-term renal decline, whereas the presence of crescents often indicates more aggressive disease [9,10]. Recent paediatric studies, including those by Wu et al. and Fabiano et al., have emphasized that early biopsy findings may predict outcomes even in children with minimal proteinuria [11].

Globally, the prevalence and clinical pattern of paediatric IgAN show geographical and ethnic variability. Asian populations generally exhibit higher disease prevalence and more severe histopathological lesions than Western counterparts [12,13]. Studies from China and Japan have reported that 30–40% of paediatric patients show mesangial proliferation or segmental sclerosis at diagnosis [14]. However, literature from South Asia remains limited, with only a few single-center studies describing clinicopathological features among children [15]. Understanding these local trends is critical for refining diagnostic strategies and guiding management decisions in resource-limited settings.

This study was therefore aimed to describe the clinical and histopathological characteristics of children diagnosed with IgA nephropathy at a tertiary-level hospital in Bangladesh. By applying the Oxford MEST-C classification to a local paediatric cohort, this work aims to contribute region-specific data to the growing body of literature on IgAN and to support future prognostic modeling in South Asian children.

Materials & Methods

This cross-sectional observational study was carried out in the Department of Paediatric Nephrology, Bangladesh Medical University (BMU), Dhaka, Bangladesh, over a three-year period from May 2024 to April 2025. The study enrolled 35 children under 18 years of age with biopsy-proven IgA nephropathy (IgAN) confirmed by dominant or co-dominant mesangial IgA deposition on immunofluorescence. Participants were selected based on predefined inclusion and exclusion criteria; children with secondary causes of IgA deposition, inadequate biopsy samples, or incomplete data were excluded. Detailed demographic, clinical and laboratory data—including age, sex, presenting symptoms, blood pressure, hematuria, proteinuria, serum creatinine and urine protein-to-creatinine ratio—were recorded at admission using a standardized proforma. Renal biopsies were obtained under ultrasound guidance with an automated biopsy gun and specimens were processed for light microscopy and immunofluorescence using standard techniques. Histopathological evaluation followed the Oxford MEST-C classification, documenting mesangial hypercellularity (M), endocapillary hypercellularity (E), segmental sclerosis (S), tubular atrophy/interstitial fibrosis (T) and the presence of crescents (C). All biopsies were reviewed independently by two experienced renal pathologists blinded to clinical data. Ethical approval was obtained from the Institutional Review Board and written informed consent was provided by parents or legal guardians prior to enrollment. Data were analyzed

using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize demographic, clinical, and histopathological characteristics. Continuous variables were expressed as mean ± standard deviation or median with interquartile range (IQR), while categorical variables were presented as frequencies and percentages.

Results

Table 1: Age distribution of study population (N = 35)

Age Group (Years)	Frequency (n)	Percentage (%)
< 6	2	5.7
6–10	15	42.9
11–18	18	51.4
Mean ± SD (years)	10.61 ± 3.78	

Table 1 presents the age distribution of the study population (N=35). The mean age was 10.61 ± 3.78 years, indicating a predominance of school-aged and early adolescent children. Nearly half (42.9%) of the participants were between 6–10 years, while 51.4% were aged 11–18 years. Only two children (5.7%) were under six years old, showing that IgA nephropathy in this cohort was primarily observed in older children.

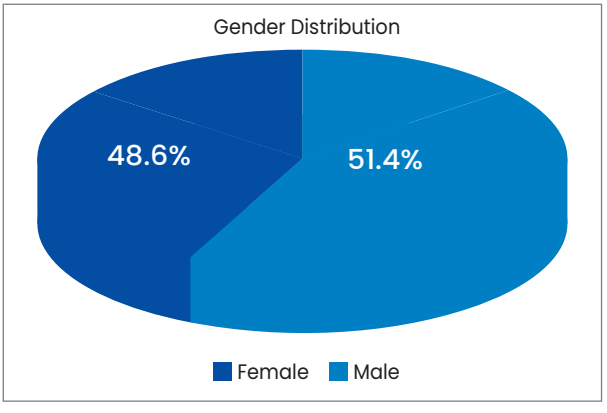

Figure 1: Gender distribution of study population (n=35)

Figure 1 illustrates the gender distribution among the 35 children included. Male patients were 18 (51.4%) and female 17 (48.6%).

Table 2: Clinical presentation and baseline laboratory findings at admission (N = 35)

Variable	Frequency (n)	Percentage (%)
Hematuria (gross or microscopic)	15	42.9
Proteinuria (clinical detection)	19	54.3
Edema at presentation	14	40.0
Hypertension at presentation	6	17.1
Required inpatient KRT (dialysis) during admission	4	11.4
Baseline serum creatinine median (IQR), mg/dL	0.63 (0.355 – 0.84)	
Baseline UPCR — median, mg/mg	2.42	

Table 2 summarizes the clinical manifestations and baseline biochemical parameters at admission. Among the 35 children, 15 (42.9%) presented with hematuria—either gross or microscopic—while 19 (54.3%) exhibited proteinuria. Edema was observed in 14 (40.0%) patients and hypertension was present in 6 (17.1%). Four children (11.4%) required inpatient kidney replacement therapy during the study period. The median baseline serum creatinine was 0.63 mg/dL (IQR: 0.355–0.84) and the median urine protein-to-creatinine ratio (UPCR) was 2.42 mg/mg.

Table 3: Histopathological findings - Oxford MEST-C derived features and crescents (N = 35)

Histology feature	Frequency (n)	Percentage (%)
M1- mesangial hypercellularity present	20	57.1
E1- endocapillary hypercellularity present	9	25.7
S1- segmental glomerulosclerosis adhesion present	12	34.3
T1/T2- tubular atrophy/ interstitial fibrosis (≥26% combined)	3	8.6
Any crescents present	4	11.4

Table 3 outlines the renal histopathological characteristics according to the Oxford MEST-C scoring system. Mesangial hypercellularity (M1) was the most prevalent feature, identified in 57.1% of biopsies. Endocapillary hypercellularity (E1) occurred in 25.7% of cases, while segmental glomerulosclerosis or adhesion (S1) was found in 34.3%. Tubular atrophy or interstitial fibrosis (T1/T2) was observed in only three children (8.6%). Crescents were present in 11.4% of cases.

Discussion

IgA nephropathy (IgAN) remains the most frequent primary glomerulonephritis worldwide and a significant cause of chronic kidney disease in children [1,12]. In the

present cohort, the mean age at diagnosis was approximately 10 years, aligning with findings from Chinese and Indian paediatric studies that reported similar age distributions [8,15]. The predominance of children aged 6–15 years reflects the tendency for IgAN to manifest during late childhood or early adolescence, possibly due to maturational immune changes that increase IgA production.

A mild male predominance observed in this cohort parallels global epidemiological trends [16,17]. Environmental influences may modulate disease expression, the male bias appears consistent across regions.

The clinical spectrum in this study—dominated by proteinuria (54.3%), hematuria (42.9%) and edema (40.0%)—mirrors the classic presentation described in paediatric series from Europe and Asia [5]. Proteinuria at onset has been recognized as a predictor of disease progression, with persistent proteinuria correlating with glomerular scarring and reduced renal survival [18,19]. Only 17.1% of our patients were hypertensive, similar to rates reported by Das et al., suggesting that early disease detection in children often precedes the onset of hypertension [20].

Baseline serum creatinine levels were generally preserved (median 0.63 mg/dL), supporting the notion that most paediatric IgAN cases present with mild renal impairment. However, the need for kidney replacement therapy in 11.4% of cases underlines those severe presentations, though infrequent, can occur even in early disease.

Histopathologically, mesangial hypercellularity (M1) was the most frequent lesion (57.1%), consistent with observations by Wu et al. and Coppo et al. [8,21]. Mesangial proliferation reflects immune complex deposition and local complement activation, key elements of IgAN pathogenesis. Segmental sclerosis (S1), detected in 34.3% of biopsies, has been widely associated with poorer renal outcomes and is considered a marker of chronic injury [7,22]. Endocapillary hypercellularity (E1), observed in 25.7% of patients, has been linked to active inflammation and may respond to corticosteroid therapy [23].

The presence of crescents (11.4%) indicates focal, severe glomerular injury. Similar low frequencies were reported in cohorts from Iran and Japan [24,25]. In paediatric patients, even limited crescent formation can influence prognosis, emphasizing the need for early immunomodulatory intervention [10,26]. Tubulointerstitial fibrosis (8.6%) was relatively uncommon, suggesting minimal chronicity at the time of biopsy, which may contribute to favorable long-term outcomes when managed appropriately.

Comparing with regional data, studies from India and the Middle East report similar histopathological distributions, although a higher prevalence of mesangial hypercellularity is often seen in Asian cohorts [13,27]. Ethnic and environmental factors, such as infections or dietary triggers, may partly explain this variability [28].

Overall, the clinicopathological correlations in this study affirm that the Oxford MEST-C classification is a robust framework for paediatric IgAN evaluation. The predominance of M1 and S1 lesions in this Bangladeshi cohort parallels international findings, reinforcing the classification's cross-ethnic applicability. Continuous follow-up is warranted to determine how these baseline lesions translate into long-term renal outcomes.

Conclusion

This study highlights that IgA nephropathy in Bangladeshi children primarily affects school-aged children and commonly presents with proteinuria and hematuria. Mesangial hypercellularity and segmental sclerosis were the predominant histological lesions, validating the clinical relevance of the Oxford MEST-C system in this population. Early detection and consistent histopathological evaluation are crucial for prognostication and guiding therapeutic interventions in paediatric IgAN in resource-limited settings.

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