

## Original Article

## Clinical Presentations and Outcome of Acute Glomerulonephritis in Children

\*Akteruzzaman M<sup>1</sup>, Paul SK<sup>2</sup>, Praveen S<sup>3</sup>, Sarkar NR<sup>4</sup>, Ahmed S<sup>5</sup>, Habib RB<sup>6</sup>, Kabir ARM L<sup>7</sup>**Abstract**

*Acute post streptococcal glomerulonephritis (APSGN) is the most common type of acute glomerulonephritis (AGN) in childhood. It has not been studied well in Bangladesh. To evaluate the clinical characteristics, complications and outcome of Acute post streptococcal glomerulonephritis (AGN). the department of Pediatric Nephrology at Sir Salimullah Medical College and Mitford Hospital, Dhaka. A prospective study from April 2011 to March 2012 were conducted among the patients diagnosed as AGN in outdoor and indoor department. Hospital records of all 34 children who had been admitted to Sir Salimullah Medical College and Mitford Hospital were reviewed. All demographic, clinical, paraclinical data and consumed medications were obtained. Among 34 cases female and male ratio were 2.4:1; mean age of was 8.76 yrs.  $\pm$  2.5 SD and peak age 7.6. Etiology of AGN was post infectious glomerulonephritis (PIGN) 85.3%, ASO titer was raised in 88.2%, 41.2% had raised blood urea, and 32.4% raised serum creatinine level. All children presented with microscopic hematuria (100%), hypertension (100%), and edema (100%), other findings are fever (55.9%), oliguria (94.1%), abdominal pain (52.9%). History of sore throat and pyoderma was present in 41.2% and 44.1% cases respectively.*

*Complications like hypertensive encephalopathy three (8.8%), urinary tract infection (UTI) one (2.9%) total seven (20%) were heart failure two (5.9%) and Acute kidney injury (AKI) one (2.9%), total seven (20%) were expired. Majority of cases manifest typically with edema, oliguria and hematuria. It usually has an uneventful course.*

**Keywords:** APSGN; Glomerulonephritis; Hypertension; Edema.

**INTRODUCTION**

Acute glomerular disease indicates that the initial and major point of impact is within the renal tissue.<sup>1</sup> It comprises a specific set of renal diseases in which an immunologic mechanism triggers inflammation and proliferation of the glomerular tissue that can result in damage to the basement membrane, mesangium or capillary endothelium.<sup>2</sup>

Acute post-streptococcal glomerulonephritis (APSGN) is the most common type of glomerulonephritis (GN) in childhood.<sup>3</sup> It usually occurs after a recent infection by group A beta-hemolytic streptococcus, and therefore known as post-streptococcal acute glomerulonephritis.<sup>4</sup> Despite a well-known association between streptococcal infection and APSGN for more than hundred years, the exact cause and also the reason that only certain strains are nephritogenic are not known yet.<sup>5-7</sup> Nevertheless, the disease has been reported following other bacterial, viral, parasitic, rickettsia, and fungal infections.<sup>8</sup> Over the past 20 years there has been a substantial decline in the reported incidence of APSGN in many industrialized countries.<sup>9-11</sup>

Acute glomerulonephritis (AGN) is a form of GN characterized by a sudden decline in glomerular filtration rate with clinical manifestations such as edema, hematuria, hypertension, oliguria and renal insufficiency.<sup>12</sup> Therefore, AGN is often referred as acute nephritic syndrome (ANS).

It is estimated that 470,000 new annual cases of PSGN are developed worldwide, 97 percent occur in developing countries, with an annual incidence of 9.5 to 28.5 per 100,000 individuals.<sup>7</sup> In outpatient pediatric department of Bangabandhu Sheikh Mujib Medical University, Dhaka 2.76% children are diagnosed as APSGN.<sup>13</sup>

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The overall incidence and patterns of disease in this population have not been characterized and not well documented in Bangladesh. Very few studies have been performed in this regard. An epidemiological study at the national level is not available yet. The risk of PSGN is increased in children between 5 and 12 years of age. It is twice more frequent in male than females.<sup>15</sup> Clinical presentation may vary from one patient to another patient. The final diagnosis of renal disease, associated with acute renal failure, nephritic syndrome or nephrotic syndrome, is made possible with the study of renal biopsy using light microscopy (LM), immunofluorescence (IF) and electron microscopy (EM).<sup>14</sup>

The present study has been undertaken to evaluate the clinical presentation, complications and outcome. Material & Methods: children with AGN in Bangladesh.

### MATERIAL AND METHODS

This prospective study was conducted between April 2011 and March 2012 in the department of Pediatric Nephrology at Sir Salimullah Medical College Mitford Hospital, Dhaka. A total of 34 cases aged 3-15 years were included from both outdoor and indoor. Verbal consent was taken from parents or guardians. A data collection sheet was developed and detail history was taken from the parents/guardians/older children. Clinical examination was performed and noted, followed by relevant investigations. Urinalysis on admission, complete blood count with erythrocyte sedimentation rate, C3 level, anti-streptolysin O (ASO) titer, serum creatinine, serum electrolytes, ultrasound of KUB, and kidney biopsy (if indicated) were done. Statistical analysis was performed using SPSS 20 package.

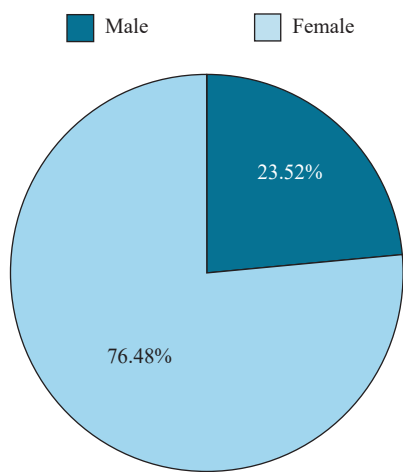


Figure 1: Sex of the study Population

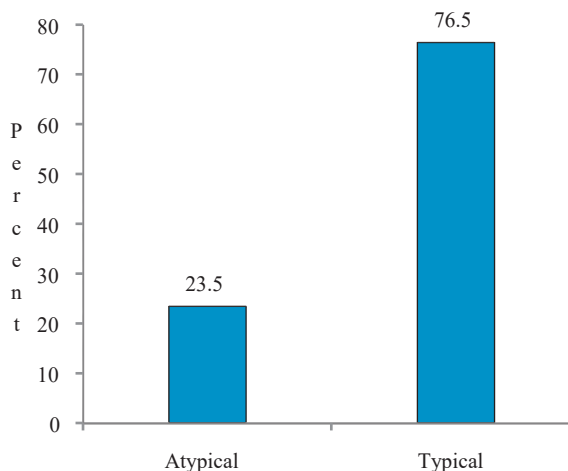


Figure 2: Clinical presentation

### RESULTS

Among thirty four children, boys were 24 and girls 10 with a male female ratio of 2.4:1. Their ages ranged from three years to 15 years and 91.2% were between 6-15 years. Mean age of presentation was 8.76 yrs.  $\pm$  2.5 SD. Peak age was 7.6.

Fourteen children (41.2%) had a history of preceding sore throat or upper respiratory infection 7-21 days before admission. 15 children (44.1%) had skin infection (pyoderma) 10-24 days before hospitalization.

Among one hundred and thirty seven children with AGN, (85.3 %) had APSGN. The most frequent clinical findings were edema, gross hematuria and hypertension. Convulsion with very high blood pressure was reported in three children.

Elevated serum creatinine was normalized within two weeks of hospital stay. One children developed rapidly glomerulonephritis (RPGN) for which biopsy was done. He received methyl prednisolone pulses along with peritoneal dialysis.

Seven (20.54%) presented with atypical presentation or complications e.g. hypertensive encephalopathy-three (8.8%), heart failure-two (5.9%), UTI-one (2.9%) and acute kidney injury (AKI)-one (2.9%).

Regarding medication, 67 % (n=23) patients received only frusemide, 14.7 % (n=5) cases frusemide and nifedipine, 2.9% (n=1) cases furosemide and captopril, 2.9% (n=1) cases frusemide and amlodipine, 2.9 % (n=1) cases furosemide, nifedipine and another antihypertensive medication. Anti-hypertensive drug other than diuretics was used in 32.4% cases. Antibiotics was used in 15 (44.1%) cases for active infection. All patients were improved except one (2.9%) who developed RPGN and expired due to AKI.

**Table I: Clinical findings of Glomerulonephritis (n= 34)**

Clinical findings	No. of Patient (Percentage)
Periorbital edema	34(100%)
Hypertension	34(100%)
Oliguria	32(94.1%)
Fever	19(55.9%)
Gross hematuria	18(52.9%)
Abdominal pain	18(52.9%)
Pyoderma	15 (44.1%)
Headache	14(41.2%)
Vomiting	14 (41.2%)
Sore Throat	14 (41.2%)
Cough	12(35.3%)
Hepatomegaly	12 (35.3%)
Burning micturition	10 (29.4%)
Shortness of breath	7 (20.6%)
Diarrhea	4(11.76%)
Altered sensorium	4(11.76%)
Joint pain	4(11.76)
Convulsion	2(5.9%)

**Table II: Paraclinical findings in AGN (n=34)**

Laboratory findings	Frequency
Microscopic hematuria	34 (100)
Pus cell >5/ HPF	7(20.6%)
Proteinuria (1+)	34(100%)
Massive proteinuria (3+/4+)	4(11.6%)
Hemoglobin (<12 mg/dl)	19(55.9%)
Raised ESR	19(55.9%)
Raised blood urea level	14 (41.2%)
Raised serum creatinine	11 (32.4%)
Hyponatremia (Na <135 mEq/L)	2 (5.9%)
Hyperkalemia (K>5.5 mEq/L)	3(8.8%)
Raised ASO titre	30(88.2%)
Low serum C3 Level	31(91.2%)
High serum cholesterol(>220 mg/dl)	3(8.8%)
Hypoalbuminemia	5(14.7%)
Positive urine culture	1(2.9)
Pleural effusion in X-ray chest	3(8.8%)

## DISCUSSION

The global burden of severe Group A streptococcal disease is concentrated largely in developing countries including Bangladesh. Majority of the cases (91.5%) were above 5 years (school going age). In Nepal, mean age of presentation was 9.2 yrs.  $\pm$  3.1 SD.<sup>16</sup> The age range in children with APSGN was 3.5 to 13 years with mean of 8.5 $\pm$  3.2 years.<sup>17, 18, 19, 20</sup> These results are in accordance with findings of the present studies. In our study, male female ratio was 2.4:1. In other studies, almost equal proportion of female and male were found (1.08:1 & 1.1:1).<sup>16, 21</sup> Male female ratio was 3.03:1 & 1.6:1 in some studies.<sup>17, 22</sup> The reasons for this gender variation are not known.

In the present study, antecedent sore throat was observed in 41.2% of cases. It was lower in Nepal, Nigeria and India in (25.5%), (25%) and (20%) respectively.<sup>16, 24, 23</sup> Similar result in Indonesia (45.8%),<sup>25</sup> but high in United States of America (USA) in (62.1%).<sup>26</sup> Pyoderma was observed in 44.1% of cases this study. Other studies lower in Nigeria and Nepal in (10%) and (19.1%) respectively,<sup>24, 16</sup> but higher in India, (60%).<sup>23</sup> This was similar in Indonesia and USA in (31.6%) and (37.9%) respectively.<sup>25, 26</sup> In the present study, antecedent sore throat was observed in 41.2% of cases. Similar result in Indonesia (45.8%).<sup>25</sup> It was lower in Nepal, Nigeria and India in (25.5%), (25%) and (20%) respectively.<sup>16, 24, 23</sup> but high in United States of America (USA) in (62.1%).<sup>26</sup>

Edema similar to our studies in India, Nepal and, Iran (83.4%) and (97.5%) respectively.<sup>23, 16, 17</sup> Lower in Indonesia and Nigeria in 76.3% and 80%.<sup>25, 24</sup> Reasons for variation as different grading edema was included in different studies. Gross hematuria was found in 30-70% of children with AGN which was similar to the present study.<sup>16, 23, 25, 27, 28, 29, 30, 31</sup>

Hypertension was observed in all of our children. Almost similar result was observed by Nepal, Iran, USA, India, Nigeria (86.2%), (75%), (73.7%), (69.1%) and (55%) respectively.<sup>16, 17, 26, 23, 24</sup> Oliguria similar in India and Nigeria (90%), and (80%) respectively.<sup>23, 24</sup> Other studies lower in Nepal and Indonesian (22.2%) and (23.9%) respectively.<sup>16, 25</sup>

Fever 55.9% in this study which was similar to Nepal (63.8%) but lower Iran (20%).<sup>16, 17</sup> Abdominal pain similar to Iran (20%) but higher than in Nepal (33.6%).<sup>17, 22</sup> So atypical presentation was more in Nepal.

Among thirty four children AGN, (85.3%) was APSGN. It is similar (89%) in Iran.<sup>17</sup> But lower in Indonesian children (66.6%) of cases.<sup>25</sup> Factors were age, under nutritional status, low socioeconomic status, less of maternal education level and the rainy season.<sup>17</sup>

The incidence of hypertensive encephalopathy observed in our study (8.8%) was similar to other studies in Nepal, India and Nigeria (9.57%), (3.4) % and (15%) respectively.<sup>16, 23, 24</sup>

Azotemia was similar to that observed in Nepal (47.8%).<sup>16</sup> It was high in Iran (80%) and low in Indonesia (10.5%).<sup>17, 25</sup>

Microscopic hematuria was found in 100% of the cases in the present study, which is similar to many other studies. In India by Puri R K et al, showed that the degree of hematuria does not indicate the severity or prognosis of the disease.<sup>27</sup> RBC casts were found to be similar to Indonesia, India (44.3%) and (37.1%) respectively.<sup>25, 23</sup> Higher percentages were observed by Travis and Kalian (60-85%) also found in USA and Nigeria (80%) and (65%) respectively.<sup>28, 26, 24</sup>

The proportion of elevated ESR in our cases was 55.9% lower than that reported in Nepal (95%), Indonesia (85.3%) and Iran (70%).<sup>27, 25, 17</sup> Our study was much higher than India (19.8%).<sup>23</sup> Anemia as indicated by hemoglobin levels <10 g/dl was reported in India (27.1%).<sup>23</sup> In our study it was higher (55.9%) which is similar to many other studies in Indonesia (61%), Iran (51.6%), Nigeria (50%) and India (44%).<sup>25, 17, 24, 27</sup> Reduction in hemoglobin and hematocrit is believed to be due to hemodilution as well as hematuria. Hypoproteinemia is also in part due to the deleterious effect of intravascular volume expansion.<sup>28, 32</sup>

Pleural effusion in our study was similar to Manhas et al. (3%).<sup>23</sup> But pleural effusion with other radiological abnormalities were very high in studies done by Kirkpatrick et al (85.5%) and Puri et al. (72%), by Albert and Rouf (81.6%) radiological abnormalities due to pleural effusion and other abnormalities pulmonary edema and pneumonia included.<sup>33, 27, 25</sup>

Hypertensive encephalopathy was observed in 8.8% cases in this study which is similar to other studies in Nepal, India and Nigeria 9.57%, 3.4% and 15% respectively.<sup>16, 23, 24</sup> AKI was observed in a higher proportion of cases by Ibadin and Abiodun (39.7%), GI McGill Ugwu (40%).<sup>34, 24</sup> But our study finding was similar to a study by Shah GS (6.38%).<sup>16</sup>

## CONCLUSIONS

Although majority of cases manifest typically with edema, oliguria and hematuria, atypical manifestations are not uncommon. Gross alterations of serum electrolytes do not occur in APSGN.

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