ORIGINAL ARTICLE

CLINICAL PROFILING AND OUTCOME OF ACUTE POST-STREPTOCOCCAL GLOMERULONEPHRITIS IN CHILDREN FROM A TERTIARY CARE CENTRE

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Background: Childhood throat and skin infection caused by group A beta haemolytic streptoccus is very common and is associated with many complications. Objectives of this study were to document the clinical profile of children with Acute Post-Streptococcal Glomerulonephritis. **Methods:** This cross-sectional study was conducted in Paediatrics Department of Ayub Teaching Hospital Abbottabad from March 2019 to March 2020. Total 56 patients fulfilling inclusion criteria were included in the study, data was recorded and analysed on SPSS-20. Descriptives recorded and *p*-values calculated. **Results:** APSGN was common (53.57%) in 7–11 years age group with a peak at 9 years. It was more common in males (62.5%). Minimum age was 3 years and maximum was 16 years, mean age being 8.72±2.762. Preceding sore throat triggered immune response in 33.9% in comparison with past streptococcal skin infection in 19.7%. ASO titres were raised in 42.9%. Hypertension was most common presentation affecting 96.4% patients followed by oedema in 67.9%. Atypical presentations of seizures and hypertensive encephalopathy were observed in 28.6%. Gross haematuria and microscopic haematuria occurred in 41.1% and 42.9% patients respectively. Majority (87.5%) did not develop acute kidney failure. **Conclusion:** APSGN in children has a male predominance. Sore throat as antecedent infection affects older children and is more common as compared to skin infection in triggering this immune response. Atypical manifestations, cardiac and neurological complications including emergencies such as status epilepticus should be watched for.

Keywords: Acute nephritic syndrome, Post infectious glomerulonephritis, Post streptococcal glomerulonephritis

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INTRODUCTION

Glomerulonephritis is the term reserved for the variety of renal disease in which inflammation of the glomerulus, manifested by proliferation of cellular elements, is secondary to immunologic mechanism.[1,2] Group A streptococcus (GAS) is one of the most common infection in children leading to a wide spectrum of diseases, ranging from the common skin and throat infections to invasive diseases and post infectious sequelae including glomerulonephritis.[3] It has been noted that over 470,000 cases of Acute Post-Streptococcal Glomerulonephritis were seen every year worldwide, out of this 97% occurring in developed countries and approximately 5000 cases (1% of total cases) resulting in death.[4]

Acute Post-Streptococcal Glomerulonephritis (APSGN) is characterized by classic triad of, rapid onset of gross hematuria, oedema, and hypertension and is usually secondary to episode of GAS pharyngitis or pyoderma.[5] Serologic evidence of a recent streptococcal infection should be sought in suspected cases of APSGN because positive streptococcal serology are more sensitive (94.6%) than history of recent infection (75.7%) or positive cultures (24.3%) in supporting the diagnosis.[6] This study aims to find and document the clinical presentations, disease profile in children presenting with APSGN. Resulting findings are discussed in detail in reference to studies in other developing countries.

METHODOLOGY

This cross sectional study was undertaken in department of paediatrics at Ayub teaching hospital Abbottabad from March 2019 to March 2020. After ethical approval; data was collected on proforma from patients fulfilling the inclusion criteria. This included patients of either gender and within ages of 3 to16 years, with clinical profile of hematuria, hypertension, oedema, presence of RBC casts in urine, raised ASO titres & hypertension. All patients of chronic kidney disease (CKD), urinary calculi, congenital urinary tract abnormalities and connective tissue disorder were excluded. Clinically suspected APSGN or nephritic syndrome but not proven on investigation as APSGN were also excluded. The data was analysed using SPSS-20. Descriptives were calculated and χ^2 test applied; $p \leq 0.05$ was considered statistically significant.

RESULTS

Of the 56 patients, 35 (62.5%) were male and 21 (37.5%) were female. Mean age was 8.72±2.762 Years

(Range 3–16 Years). APSGN mostly (53.57%) affected children in age range 7–11 years with a peak at 9 years (Table-1).

Table-1: Age distribution of patients

Age group	Number	Percentage
3–6 Years	15	26.79
7–11 Years	30	53.57
12–16 Years	11	19.64

Sore throat affected 33.9% children and was more common in the older age group of 10–12 year, whereas skin infection affected considerably lesser patients, i.e., a total of 19.7% but was a precipitating cause for APSGN in the younger age group of 6 years age. From the total only 24 (42.9%) had raised ASO titres. A history of preceding or accompanying fever was recorded in 35.7% of cases. Hypertension was the most common clinical presentation present in 54 (96.4%) of patients, after hypertension, oedema was the second commonest manifestation and was observed in 38 (67.9%) of patients. Atypical manifestations such as seizures and hypertensive encephalopathy were commonly observed in nearly 16 (28.6%) of patients. Other cerebral complications such as visual loss were less common and seen in only 3.6%. In renal manifestations, 23 patients presented with gross haematuria and 21 with microscopic haematuria. Majority of the patients did not develop acute kidney failure as a complication so it was a lesser known complication in our study. Cardiopulmonary manifestations such as cardiomegaly, shortness of breath were present in between 8 to12% of patients, and pulmonary oedema in 3.6% only. Casts were seen in urine in 66% and pus cells in 57.1 % but only 3.6% had dysuria. (Table-2).

Table-2: Descriptive Statistics (n=56)

Clinical presentations/ Labs	Observation	N	%	*p*
Sore throat	Present	19	33.9	0.462
Skin infection	Present	11	19.7	0.471
Hypertension	Present	54	96.4	0.270
CCF	Present	7	12.5	0.142
Plain chest X-ray findings	Normal	46	82.1	0.381
	Cardiomegaly	7	12.5	
	Pulmonary oedema	2	3.6	
	Bronchopneumonia	1	1.8	
ASO titre	Positive	24	42.9	0.403
Oedema	Present	38	67.9	0.33
Facial swelling	Present	16	28.6	0.148
Fever	Present	20	35.7	0.222
Headache	Present	8	14.3	0.240
Vomiting	Present	7	12.5	0.042
Shortness of breath in days	Present	5	8.9	0.039
Cola coloured urine (gross haematuria)	Present	19	33.9	0.18
Status epilepticus	Present	7	12.5	0.004
Seizures	Present	16	28.6	0.010
Hypertensive encephalopathy	Present	11	19.6	0.184
Unconsciousness	Present	8	14.3	0.120
Hemianopia/visual loss	Present	2	3.6	0.140
Dysuria	Present	2	3.6	0.347
Oliguria	Present	1	1.8	0.325
Gross haematuria	Present	23	41.1	0.168
Microscopic haematuria	Present	24	42.9	0.131
Cast in urine	Present	37	66.1	0.164
C3 levels low	Present	11	-	-
Pus cells in urine	1–20 pus cells in urine	32	57.1	
	21–40 pus cells in urine	2	3.6	
	Numerous	7	12.5	
	Missing	14	25.0	
Acute renal failure	Absent	49	87.5	0.142
	Couldn't establish	7	12.5	

DISCUSSION

Patients in the present study were 7–11 years old with peak at 9 years. Agarwalla SK observed not only more cases in same age groups but a male preponderance as well.[7] In a Bangladesh study by Akiteruzzaman M, similar age groups were recorded[8], whereas in Nepal most common age of presentation for APSGN was 9 years.[9] Tejani *et al.* also observed APSGN affecting age group between 2–10 years with only less than 5% being below the age of 2 years.[10] In a South Indian study mean age recorded was recorded at 6.8.[11] Reason that APSGN is rare in the very young children because of their immature immune response and since it is an autoimmune condition so requires a fully responsive immune system that is yet to develop in young child.[12,13]

APSGN is known to affect males more commonly as compared to females. In a study done in Bangladesh, this ratio was found to be 2.4:1.[8] Agarwalla SK found that males were affected 1.6 times more as compared to females.[7] The cause for this male predominance isn't clear.[14]

Fever was recorded in 35.7% of patients and a preceding history of sore throat was a more common complaint affecting 33.9% as compared to a history of skin infection which was recorded only in 19.7% children. Sore throat as a preceding infection was most common in the older age group 12 years, whereas skin infection as the precipitating factor mostly affected the 6 years old. Bhalla K *et al* recorded sore throat to be the commoner antecedent factor affecting 70.83% compared to skin infection present in 10.42% of cases. The age groups also matched with ours as it was also noted by Bhalla *et al* that pharyngitis less common in the younger children.[15]

Oedema affected 67.9% children and this presentation was less common in our study than studies done in India and Nepal and India (97.97.5% and 83.4% respectively)[9,11] and was more in accordance with an Indonesian study affecting 76.3% children.[16]

ASO titres were recorded high in 42.9% cases. ASO rising titres are helpful in aiding diagnosis of recent streptococcal infection but may not be so helpful in skin infection by streptococcus as adipose tissue in the skin may be acting as a barrier.[17] Interestingly among atypical manifestations, neurological complications were common in our setup and acute kidney injury was less common outcome.

Malla K *et al* also recorded hypertensive encephalopathy in 18.6% patients, our study showed even a higher percentage (19.6%).[18] In our study hypertension was recorded in 54 patients and led to seizures and hypertensive encephalopathy in 19.6% of patients. Two patients had to undergo a CT scan of the brain that showed cerebral ischemia. In two other studies hypertensive encephalopathy was a much lesser presentation observed in 5% and 4.3% of cases respectively.[19,20]

Agarwalla *et al* recorded hypertension in 90% patients and cerebral complications in 35% of patients.[7] Accompanying cerebral manifestations in our study remained upto14%. In the Bangladesh study the atypical presentation of hypertensive encephalopathy was seen in only 8.8%[8], and even lower at 4.6% by Gunshekran *et al* study.[11]

Gross and microscopic hematuria occurred in 41.1% and 42.9% respectively. Akterruzeman K *et al*, recorded microscopic hematuria in 100% of the patients but presence of hematuria might not be an indicator of severity of disease.[8] Casts in urine were found in 66.1% of our patients .This Higher percentage was present in studies by Travis and Kalian (60–85%), also found in USA and Nigeria (80%) and (65%) respectively.[21–23] This was a less common finding in the Bangladesh study, i.e., 45%[8], and was a less common occurrence in studies done in Indonesia, and India (44.3% and 37.1%) respectively.[16,24] Agarwalla SK found serum C3 level to be low in 83% of the cases[7], but as it's done in private lab we could perform only in a few patients, a low level was found in 11 and a percentage can't be quoted. Other renal complications like acute kidney injury and nephrotic range proteinuria couldn't be established in any patient. Studies done elsewhere found Azotemia to be higher (47.8%)[8,9] and even up to 80% in Iran (80%), but low in Indonesia, where it occurred in only 10% cases.[25,26]

Likewise cardiac complications were less common as compared to studies done elsewhere. Breathlessness and cardiomegaly were noted between 10–12.5% cases while pulmonary oedema was present in only 2 (3.6%) cases, with bronchopneumonia in only one case. Pleural effusion in our study was similar to Manhas *et al* (3%).[24] Pleural effusion with other radiological abnormalities were very high in studies done by Puri *et al* (72%) and Kirckpatrick *et al* (85.5%).[26,27] Albar and Rauf recorded (81.6%) radiological abnormalities due to pleural effusion and other abnormalities such as pulmonary oedema and pneumonia. Chest X-ray was normal in 82.1% cases in our study.[16,26,27]

Malla K quoted that Heart failure and acute renal failure were the sole systemic complications in 7 out of 29 and 2 out of 29 APSGN patients respectively.[18] This was also noted by Olowa WA in Nigeria.[28] Heart failure was seen in 3% cases in another study[29], whereas in our study only 10% presented with shortness of breath, cough, and hepatomegaly. Acute renal failure defined as abrupt or rapid decline in renal filtration function is often transient and usually completely reversible in APSGN. Acute renal failure was present in 56 (76%) in one study and dialysis required in 14, but this was an uncommon finding in our study group.[30,31]

CONCLUSION

APSGN more commonly affects males and is a cause of considerable morbidity. Sore throat as the antecedent infection affects mostly older children as compared to skin infection which tends to precipitate the immune response in the younger age group.

RECOMMENDATIONS

APSGN is a cause for considerable morbidity and suspicion should be kept high in children above 6 years of age till 18 years especially in cases with unusual presentations such as status epilepticus. Blood pressure needs close monitoring to off-set hypertensive emergency and cardiac and neurological complications. Atypical manifestations should be watched for.

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