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## Study of Clinical Outcome of Children with Glomerular Diseases at a Tertiary Hospital

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### ABSTRACT

Glomerular diseases are the one of the common causes of end stage renal diseases worldwide probably due to prevalence of infectious diseases in developing countries. Present study was aimed to study clinical outcome of children with glomerular diseases at a tertiary hospital. Present study was prospective, observational study, conducted in children of 1-12 years with glomerular diseases admitted at our hospital. In present study, out of 35 patients majority were less than 6 years (80 %) and mean age of presentation was 4.87. Out of 35 patients majority were males (60 %) and male: female ratio was 1.5:1. Out of 35 patients, 28.6% were improved with antibiotics, 5.7% were improved with only anti hypertensive alone, 11.4% were improved with diuretics alone, 22.9% were improved with anti hypertensive and diuretics, 2.9% steroids alone, 20% were improved with diuretics and steroids, 2.9% were improved with diuretics, steroid and mycophenolate mofetil, 2.9% were improved only with fluids. Out of 35 patients, around 91.5% (N=32) were improved Prognosis and 8.5% (N=3) were referred to higher institution. Out of 16 patients, 100% (N=16) were found improved Prognosis PIGN. Out of 9 patients, 77.7% (N=7) were improved Prognosis NS and 22.3% (N=2) were referred to higher institution. Out of 10 patients, 90% (N=9) were improved Prognosis- Hematuria and 10% (N=1) were referred to higher institution. Out of 9 patients, 77.7% (N=7) were Remitted Prognosis based on Steroid response and 22.3% (N=2) were referred to higher institution for Relapse. Both PIGN and Minimal change NS in children can be properly evaluated and treated promptly which shows better outcome in our study.

## INTRODUCTION

Glomerular diseases generally present as a constellation of features that includes hematuria, edema, proteinuria and hypertension. Glomerulonephritis is caused by number of disorders that cause glomerular injury due to inflammation. Glomerular diseases are the one of the common causes of end stage renal diseases worldwide probably due to prevalence of infectious diseases in developing countries<sup>[1]</sup>. Glomerulonephritis accounts 10-15% of glomerular diseases in USA. In GN, Males are more prone than females<sup>[2]</sup> particularly affecting children and young adolescents of 5-15 years of age<sup>[3]</sup>. IgA nephropathy is most common GN worldwide. The incidence of post infectious GN has been reduced in most of western countries, but remains more common in countries like Africa, The Caribbean, Pakistan, Malaysia, India and South America<sup>[3]</sup>. The reduction in incidence is due to better health care system and economic conditions improvement. Minimal change disease is most common cause for nephritic syndrome in children of 1-8 year accounts for 90% but also can occur in older children and adults, Boys are more prone than girls<sup>[4]</sup>. Present study was aimed to study clinical outcome of children with glomerular diseases at a tertiary hospital.

## MATERIALS AND METHODS

Present study was prospective, observational study, conducted in department of Pediatrics, Chengalpattu Medical College and Hospital, Chengalpattu, India. Study duration was of 1 year (Sep. 2013 to Aug. 2014). Study was approved by institutional ethical committee.

### Inclusion Criteria:

- All children of 1-12 years with glomerular diseases admitted at our hospital, parents/guardian willing to participate in present study.

### Exclusion Criteria:

- Children <1 years.
- Children >12 years.
- Congenital heart diseases.
- Acute severe respiratory diseases.
- Acute febrile illness.
- Acute poisoning.

Informed written consent was taken from the parents/guardians. Pre-structured proforma was used for taking history, appropriate examination and investigations were done, investigations like complete blood count, peripheral smear, serum albumin, urine examination and culture etc. were done in all the patients. Sulfosalicylic acid test was used for urine proteins, Eshbach's albuminometer was used for protein creatinine ratio and 24 hours urine protein. BP, weight, intake and output chart, abdominal girth, urine for proteinuria were done daily on all patients.

Data was collected and compiled using Microsoft Excel, analyzed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

## RESULTS AND DISCUSSIONS

In present study, out of 35 patients majority were <6 years (80 %) and mean age of presentation was 4.87. Out of 35 patients majority were males (60%) and male: female ratio was 1.5:1. Out of 16 patients, 31.3% (N=5) were presented with Impetigo history among patients prior to admission. Out of 9 patients, 33.3% (N=3) were presented with relapse history among NS patients prior to admission.

**Table 1: General Characteristics**

Characteristics	No. of subjects	Percentage
Age group (in years)		
<6 yrs	28	80
>6yrs	7	20
Gender		
Male	21	60
Female	14	40
Past History		
Impetigo	5	31.3
Past History-Nephrotic syndrome		
Relapse	3	33.3
No Relapse	6	66.7

Out of 35 patients 45.7% (N=16) were Post infective glomerulonephritis, 25.7% (N=9) were Nephrotic Syndrome, 28.6% (N=10) were Hematuria for evaluation.

**Table 2: Disease Distribution**

Disease distribution	No. Of patients	Percent
Disease distribution	16	45.7
Hematuria for evaluation	10	28.6
Nephrotic syndrome	9	25.7

In present study, common symptoms observed were facial puffiness (65.71%) followed by red coloured urine (40%), decreased urine output (31.43%), swelling of legs (28.57%), fever (20%), abdominal distension (14.29%), cola coloured urine (8.57%) and painful micturition (8.57%).

**Table 3: Symptoms Distribution**

Symptoms	No. of patients	Percentage
Facial puffiness	23	65.71
Red coloured urine	14	40
Decreased urine output	11	31.43
Swelling of legs	10	28.57
Fever	7	20
Abdominal distension	5	14.29
Cola coloured urine	3	8.57
Painful micturition	3	8.57

Out of 35 cases, around 14.3% (N=5) had Urine Albumin 3+ and around 14.3% (N=5) had Urine Albumin 4+. Out of 35 patients 45.7% (N=16) were presented with Urine RBC and 22.8% (N=8) were presented with Urine cast. Out of 35 patients, around 91.4% (N=32) were urine culture negative and 8.6% (N=3) were found positive.

**Table 4: Urine Examination**

Characteristics	No. of subjects	Percentage
Urine Albumin		
1+	9	25.7
3+	5	14.3
4+	5	14.3
Nil	11	31.4
Trace	5	14.3
Urine		
RBC	16	45.7
CAST	8	22.8
NIL	11	31.5
Urine Culture Sensitivity		
Citrotobacter	1	2.9
EColi	1	2.9
Klebsiella	1	2.9
No Growth	32	91.4

Out of 35 patients, around 85.7% (N=30) were ASO titer negative and 14.3% (N=5) were found positive in PIGN patients.

**Table 5. Aso Titer**

ASO Titre	NO. OF Patients	Percent
Positive	5	14.3
Negative	30	85.7

Out of 35 patients, around 85.7% (N=30) were CRP negative and 14.3% (N=5) were found positive.

**Table 6: C-Reactive Protein**

CRP	No. of subjects	Percentage
Negative	30	85.7
Positive	5	14.3

Out of 35 patients 22 were done Complement C3 and found 77.3% (N=17) were normal, 22.7% (N=5) were found low Complement C3. Out of 35 patients 11 were done Complement C3-PIGN and found 54.5% (N=6) were normal, 45.5% (N=5) were found low Complement C3. Out of 35 patients 3 were done Complement C3-Haematuria and found 100% (N=3) normal. Out of 35 patients 8 were done Complement C3 among NS patients and found 100% (N=8) were normal.

**Table 7: Complement C3**

Complement C3	Total (n=22)	PIGN (n=11)	Hematuria (n=3)	NS (n=8)
Normal	17 (77.3 %)	6 (54.5 %)	3 (100 %)	8 (100 %)
Low	5 (22.7 %)	5 (45.5 %)	0	0

Out of 35 patients, around 62.9% (N=22) were Normal USG Abdomen and 37.1% (N=13) were found Abnormal. Out of 35 patients 91.5% (N=32) were Normal Chest X-ray and 8.5% (N=3) were found Abnormal.

**Table 8: Radiological Examination**

Characteristic	No. of subjects	Percentage
USG abdomen		
Normal	22	62.9
Abnormal	13	37.1
Chest x-ray		
Normal	32	91.5
Abnormal	3	8.5

Out of 35 patients, 28.6% were improved with antibiotics, 5.7% were improved with only anti

hypertensive alone, 11.4% were improved with diuretics alone, 22.9% were improved with anti hypertensives and diuretics, 2.9% steroids alone, 20% were improved with diuretics and steroids, 2.9% were improved with diuretics, steroid and mycophenolate mofetil, 2.9% were improved only with fluids.

**Table 9: Improvement with Treatment**

Improvement with	No. of subjects	Percentage
Nil	1	2.9
Antibiotics	10	28.6
Antibiotics/anti hypertensive	2	5.7
Antibiotics/anti hypertensive/diuretics	8	22.9
Antibiotics/diuretics	4	11.4
Antibiotics/diuretics/steroids	7	20
Antibiotics/diuretics/steroids/mycophenolate mofetil	1	2.9
Antibiotics/steroids	1	2.9
Plenty of fluids	1	2.9

Out of 35 patients, around 91.5% (N=32) were improved Prognosis and 8.5% (N=3) were referred to higher institution. Out of 16 patients, 100% (N=16) were found improved Prognosis PIGN. Out of 9 patients, 77.7% (N=7) were improved Prognosis NS and 22.3% (N=2) were referred to higher institution. Out of 10 patients, 90% (N=9) were improved Prognosis-Hematuria and 10% (N=1) were referred to higher institution. Out of 9 patients, 77.7% (N=7) were Remitted Prognosis based on Steroid response and 22.3% (N=2) were referred to higher institution for Relapse.

**Table 10. Prognosis**

Prognosis	Improved/Remission	Referred	Relapse
Overall (n=35)	32 (91.5 %)	3 (8.5 %)	
PIGN (n=16)	16 (100 %)		0
NS (n=9)	7 (77.7 %)		2 (22.3 %)
Haematuria (n=10)	9 (90 %)		1 (10 %)
NS on basis of steroid response (n=9)	7 (77.7 %)		2 (22.3 %)

Out of 35 patients 80% (n=28) were <6 yrs and 20%(N=7) were more than 6 yrs. the mean age of presentation is 4.87. In Coppo<sup>[5]</sup> study, out of 432 children were less than or equal to 15 yrs, the mean age of presentation 8.96. Out of 35 patients 60% (n=21) were males and 40% (N=14) were females. Male: Female ratio is 1.5: 1, In fore man J.W Chan JC study<sup>[2]</sup> males accounted 54% and females 46%, male: female ratio is 1.2:1. Out of 35 patients 31.3% among PIGN were presented with impetigo and 33.3 % among NS were presented with relapse history. In our study out of 35 patients 45.7% (N=16) were PIGN, 28.6% (N=10) were hematuria for evaluation, 25.7 (N=9) were Nephrotic syndrome. In our study, out of 35 patients, most of the patients (N=23) were presented with peri orbital puffiness, 14 was presented with red colored urine, 10 was presented with swelling of legs, 11 presented with decreased urine output, 3 was presented with cola colored urine, 7 was presented with fever, 5 were presented with abdominal distension, 3 were presented with painful micturition.

Out of 35 patients 37.1% were presented on day 2 of symptoms, 14.3% were presented on 7<sup>th</sup> day. Urine color at presentation out of 35 patients, 25.7% presented with red color urine, 17.1% were presented with cola colored urine. Out of 35 patients in our study 14.3% (N=5) presented 4+urine albumin, 14.3%(N=5) with 3+urine albumin. In Yong-hoog Park<sup>[6]</sup> study, total 1044 school children were screened for proteinuria, reported as 26.4% were found having isolated proteinuria, 13.5 % were found having both proteinuria and hematuria. Out of 35 patients 8.6% (N=3) were presented with positive urine culture found positive with Klebsiella, E coli, Nitrobacter. 91.4% were presented with no growth. Out of 35 patients, 14.3% were presented with positive titer among PIGN, 85.7% were presented with negative titer, no positive titer was found among NS/Hematuria for evaluation. In Levy<sup>[7]</sup> study, 150 cases were studied for a period of 3 years elevation of ASO titer was significantly higher to 96% in PIGN. Out of 35 patients 85.7% (N=30) were found CRP negative and 14.3% were found positive CRP among PIGN. Out of 35 patients 62.9% (N=22) were found normal USG abdomen and 31.7% (N=13) were found abnormal with pleural effusion, hepatosplenomegaly among NS patients, bladder wall thickening for hematuria evaluation. Chest x-ray showed 8.5% (N=3) were found abnormal and 91.5% (N=32) were found normal with pleural effusion among NS patients. Out of 35 patients, 22 were done serum complement, among this 77.3% (N=17) were found normal in both NS and PIGN patients. 22.7%(N=5) were found low complement values among PIGN patients. After 6 weeks repeat complement C3 test was done, Low complement patients were found normal C3 values in 100% patients. Out of 35 patients,28.6% were improved with antibiotics,5.7% were improved with only anti hypertensive alone, 11.4% were improved with diuretics alone, 22.9% were improved with anti hypertensive and diuretics, 2.9% steroids alone, 20% were improved with diuretics and steroids, 2.9% were improved with diuretics, steroid and mycophenolate mofetil, 2.9% were improved only with fluids. Out of 35 patient, 91.5% were improved with proper management, 8.5% were referred to higher institution for follow up care. Among PIGN patients, (N=16) patients were improved with antibiotics, anti hypertensive and diuretics. None were referred. Among NS, 77.7% were improved with diuretics and steroids and found remitted. 22.3% were found steroid dependent. Among hematuria for evaluation, 90%were improved with proper management. 10% were referred to higher institution as that child had recurrent hematuria and he was evaluated for suspected IgA nephropathy for whom renal biopsy is advised. Among 16 PIGN patients, all patients were

improved. 7 out of 9 patients were found remitted among NS patients, 2 were referred to higher institution, they were found to be steroid dependent NS. Among 10 hematuria for evaluation cases 9 were improved, only one was referred to higher institution for recurrent hematuria for whom renal biopsy was advised. On following up that child they have not done renal biopsy till now. The clinical presentation of childhood glomerular diseases may vary from one patient to another<sup>[8-10]</sup>. On the other hand the same clinical presentation may be associated with different glomerular diseases<sup>[11]</sup>. There is a definite need to know the clinical presentation, management guidelines and a good follow up of patients affected by these conditions by formation an individualized hospital registry.

## CONCLUSION

Present study clinical profile is concordant with glomerular diseases in children in India. Both PIGN and Minimal change NS in children can be properly evaluated and treated promptly which shows better outcome in our study. Early diagnosis, proper treatment and regular follow up care prevents end stage kidney disease among children

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