

Clinico-biochemical Correlation of Acute Glomerulonephritis in Children

K. Vani Bai¹, B. Deeva Kumar²

ABSTRACT

Introduction: Acute nephritic syndrome consists of sudden onset of oedema, hematuria, hypertension, oliguria and varying degree of proteinuria. It may follow infection with a variety of bacteria, viruses and parasites or can be a part of systemic diseases (or) as primary glomerular disease. The aim of this work was to study the clinical, biochemical parameters of acute glomerulonephritis in children.

Material and methods: The present study included 50 cases of acute glomerulonephritis in children belonging to the age group of 2 to 12 years attended to department of pediatrics of Government General Hospital, Guntur (A.P) during the year July 2016- June 2017.

Results: the incidence is more common in between 6-12 years, commonly seen in low socio economic group predominantly in females.

Conclusion: There is very good recovery for acute glomerulonephritis. Spontaneous recovery occur in most instances, children with normal blood pressure, normal urine output can be managed at home.

Keywords: AGN, hypertension, hematuria.

INTRODUCTION

Acute nephritic syndrome consists of sudden onset of oedema, hematuria, hypertension, oliguria and varying degree of proteinuria. It may follow infection with a variety of bacteria, viruses and parasites or can be a part of systemic diseases (or) as primary glomerular disease. Acute glomerulonephritis is an inflammatory process affecting primarily the glomerulus, with infiltration and proliferation of acute inflammatory cells. Acute glomerulonephritis is regarded as primary disease of kidney. Cardiovascular disturbances forming conspicuous part of the clinical picture, the main cardiovascular changes being cardiac failure which is often seen in infants and children. In acute glomerulonephritis in children myocardial function is not commonly depressed. Myocardial failure occur secondary to arterial hypertension.¹⁻⁶

The aim of this work was to study the clinical, biochemical parameters of acute glomerulonephritis in children attended to department of pediatrics of Government General Hospital, Guntur (A.P) during the period of July 2016 to June 2017.

MATERIAL AND METHODS

The present study included 50 cases of acute glomerulonephritis in children belonging to the age group of 2 to 12 years admitted in pediatric ward of Government General Hospital, Guntur(A.P) during the period July 2016 to June 2017.

Selection of cases were done according to the criteria of

acute glomerulonephritis i.e., oliguria, edema, hematuria, associated with hypertension, pharyngitis or skin lesions.⁶⁻⁹ Hypertension is considered to be present when diastolic pressure was above 90 mm Hg in children above 6 years of age and above 80 mm Hg in younger children, microscopic hematuria was indicated by the presence of more than 5 RBC/HPF in 10 ml of freshly voided centrifuged urine.

STATISTICAL ANALYSIS

The observations of this study are represented in the tables. Descriptive statistics were used to interpret the data.

RESULTS

Most commonly involved age group is 6 – 8 years (42%) followed by 10- 12 years (26%) least common is 2- 4 years (4%). (Table-1)

Most commonest presentation is puffiness of face (90%) followed by oliguria (70%) oedema of feet (50%). (Table-2) Most common clinical finding is puffiness of face (90%), oedema of feet (70%), and hypertension (60%) (table-3). Out of 50 cases 45 cases have decreased complement levels (table-4).

Total Incidence

From July 2016 to June 2017 in paediatrics department, Government General Hospital, Guntur (A.P)

Seasonal Incidence

Most of the cases admitted from August to December.

Age and Sex Distribution

The incidence is less in between the age 2 to 4 years, more cases admitted in between the age of 6 to 8 years^{1,2} and 10 to 12 years. Most of the cases observed in female children.

Social Status

All most all cases except one case observed in low socio-economic status.

Clinical Profile

Most of them presenting with red colour urine, puffiness of the face oliguria, edema, breathlessness, headache, vomiting, pain abdomen, convulsions, fever, altered sensorium were

¹Assistant Professor, ²Associate Professor, Department of Pediatrics, Government, General Hospital, Guntur Medical College, Guntur, AP, India

Corresponding author: Dr. B. Deeva Kumar, Associate Professor, in Pediatrics, GGH, Guntur, AP, India

How to cite this article: K. Vani Bai, B. Deeva Kumar. Clinico-biochemical correlation of acute Glomerulonephritis in children. International Journal of Contemporary Medical Research 2017;4(10):2028-2030.

the presenting symptoms. Other common finding include the anaemia with x-ray finding of increased pulmonary vasculature and some times cardiomegaly and volume overload symptoms in some children.

Hypertensive encephalopathy change in CT Scan Brain and some with hypertensive changes in fundus examination.

Blood Pressure

Hypertension was recorded in 30 children (60%) with mild, moderate and severe hypertension.

Lab Investigation

Albuminuria in 86% of the cases (Trace,+1,+2,+3), 98% with hematuria including microscopic hematuria).

Serological

ASO titers increased mainly in children with pharyngitis. The children suffering with pyoderma didn't show elevated levels of ASO titers. The levels of the ASO titer is unrelated

to the incidence, severity or prognosis of the renal disease. 30 children have the H/o pharyngitis, in all these children ASO titre is positive. 20 children have history of pyoderma and in only 3 members were ASO titers positive.

Blood Urea and Serum Creatinine

The blood urea and serum creatinine also not increased that much. There is disproportionate rise between the blood urea and serum creatinine. There is only one child with raised levels of blood urea and serum creatinine. (Blood urea-80mg/dl, serum creatinine-2.2.)

Serum Electrolytes

Normal in most of them with hyponatremia in 6 children(12%) mainly suffering with seizure activity, hypokalemia in 2 members, hyperkalemia in one children.

Serum Cholesterol

Most of them have normal serum cholesterol except four children who shows the MPGN type-II, SLE, FSGN on renal biopsy.

Serum total protein

60% of the children serum total protein level in between 5 to 6 gram/dl, 40% with more than 6 gram/dl.

Serum Complement level

Except 5 cases remaining 45 children in the study had decreased levels of complement. Out of there 45 children only 31 children underwent repeat serum complement levels after 2 months (8 weeks) 29 children had the normal complement levels two cases still has decreased levels of complement which on renal biopsy shows one case of membranoproliferative glomerulonephritis type-II.^{7,8} One child is suffering with systemic lupus erythematosus in whom antinuclear antibodies positive.

Radiological appearance of the chest

Most of the children had normal study of x-ray chest. Some shows cardiomegaly, some with increased pulmonary vasculature(congestion) very less with pleural effusion.

U/s Abdomen

Most of the children have bulky kidney, decreased echotexture and in those children suffering with hypertensive encephalopathy shows the bulky kidney with increased echotexture.

Mortality Pattern: Out of 50 cases there is no mortality.

DISCUSSION

In our study out of 50 cases two cases (4%) are between 2 – 4 years age group. 36 cases (72%) are between 2 to 10 years and 12 cases (24%) are above the age of 10 years. So, maximum incidence is between the 2 to 10 years. Study of Manhas¹⁰ et al had shown 17% of children are below the age of 5 years and 43% are between the age of 5 to 12 years.

In this study, the most common presenting symptom is

Age	Male	Female	Total	Percentage
2 to 4 Y	2	0	2	4
4 to 6 Y	2	5	7	14
6 to 8 Y	12	10	22	44
8 to 10 Y	5	2	7	14
10 to 12 Y	3	9	12	24
Total	24	26	50	100

Table-1: Age and Sex incidence

Presenting Symptoms	No. of cases	Percentage
Puffiness of the face	45	90
Swelling of the feet	25	50
Oliguria	35	70
Macroscopic Hematuria (redcoloured urine)	22	44
Convulsions	14	28
Breathlessness	9	18
Pain Abdomen	10	20
Headache	14	28
Vomiting	14	28
Altered Sensorium	9	18
Skin Infection	16	32

Table-2: Presenting Symptoms

Clinical Findings	No. of Cases	Percentage
Puffiness of Face	45	90
Edema Feet	35	70
Anasarca	10	20
Ascites	5	10
Hypertension	30	60
Circulatory Overload	9	18
Hepatomegaly	9	18
Hypertensive Encephalopathy	9	18

Table-3: Clinical Findings

	No. of Cases	Percentage
No. of persons with diminished complement levels at presentation	45	90%
Repeat complement After two months (done in 31 children dropouts are 19)	29(out of 31)	96%

Table-4: Complement Levels

puffiness of the face (90%) the other symptom is the oliguria(70%) macroscopic hematuria(44%) and edema of the feet(50%).

Sarala¹¹ et al has documented the following clinical features in the study of 135 children. 25% have edema, 5.2% pulmonary edema, 13.3% azotemia, 4.4% hypertensive encephalopathy. Poon-King et al¹² noted that the presenting symptom in all patient was odema, only 25% has gross hematuria at once, 9.2% has hematuria on microscopic examination.

Blood Pressure recording with standard sphygmomanometer are taken many times in a single day and classified normal, mild, moderate and severe on the evaluated blood pressure when analysed for age.

Hypertension is present in 30 (60%) children out of 18(36%) mild hypertension, in 4(8%) children moderate hypertension, and 8(16%) has severe hypertension.

Manhas et al showed 69% had hypertension out of which 38.3% had mild, 29.7% has moderate 5.1% had severe hypertension.¹⁰

Roentgenogram analysis of 50 children with AGN in this study showed 58% normal cardiac shadow with the prominent lung vasculature study, cardiomegaly 32%, pneumonitis in 10%.

The results in this study are correlating with the study of Poonking et al, study of Manhas et al, study of Sarala et al, study of John Kirkpatrick. Most of the children with acute glomerulonephritis present with hypertensive encephalopathy, acute cardiac failure and acute renal failure.¹⁰⁻¹²

There is very good recovery for acute glomerulonephritis. Spontaneous recovery occur in most instances, children with normal blood pressure, urine output of more than 400ml can be managed at home. Bed rest is beneficial in those with edema and hypertension. Urine output, oral input and weight should be recorded everyday. Sodium intake is restricted in all cases with edema and hypertension. All foods rich in potassium need to be restricted till the urinary output is more than 400ml per day. If we manage the crisis, the outcome will be good in case of acute glomerulonephritis.

CONCLUSION

Following conclusions are drawn from the present study.

There is male predominance between 2 to 10 years, female predominance between 10 to 12 years. 4 to 10 years common age group affected in this study. Majority of the cases are seen during the period between August to December. Preceding illness is recorded in 64% of cases and upper respiratory infection being the commonest. Almost all patients presented with insidious onset of puffiness of the face and pedal edema. Macroscopic hematuria in 44% of the cases. Microscopic hematuria all most in all cases.(98%). Majority of the children has proteinuria(from trace to ++). Only 6% of children with 3+ proteinuria. All children with H/o. URI showed increased levels of ASO titers,those with H/o. pyoderma are negative for ASO titers. Majority of the children had low level of complement (C3) at the time of admission and normal level of complement (c3)

after 2 months (8 weeks). Most of the children x-ray chest showed normal cardiac shadow with increased pulmonary vascularity. In most of the children, ultra sound abdomen showed bulky kidney with decreased echotexture.

There is disproportionate rise in blood urea and serum creatinine. The serum protein levels are normal in most of the children with negligible levels of 24 hour urinary protein. All the children recovered with crystalline penicillin, restriction of salt and oral fluid, diuretics and antihypertensive therapy if necessary.

REFERENCES

1. Bagga A, Menon S. Rapidly progressive glomerulonephritis. In: Geary DF, Schafer F (Eds). *Comprehensive pediatric Nephrology*. Philadelphia: Mosby; 2008.pp.319-27.
2. Bagga A, Srivastava RN. Acute and rapidly progressive glomerulonephritis. In: Srivastava RN, Bagga A (Eds). *Pediatric Nephrology*, 5th edition. New Delhi: Jaypee Brothers; 2011. pp.130-52.
3. Eison TM, Ault BH, Jones DP, et al. Post-streptococcal acute glomerulonephritis in children: clinical features and pathogenesis. *Pediatr Nephrol*. 2011;26:165-80.
4. The fourth report on the diagnosis, evaluation and treatment of high blood pressure in children and adolescents. National high blood pressure education program working group on high blood pressure in children and adolescents. *Paediatr*. 2004;114:555-76.
5. Rajajee S. post-streptococcal acute glomerulonephritis: a clinical, bacteriological and serological study. *Indian J Pediatr* 1990;57:775-80.
6. Vamvakopoulos J, Savage CO, Harper L. ANCA-associated vasculitides-lessons from the adult literature. *Pediatr Nephrol*. 2010;25:1397-1407.
7. Vijayakumar M, Nammalwar BR. Acute proliferative glomerulonephritis and crescentic glomerulonephritis. In: Nammalwar BR, Vijayakumar M (Eds): *Principles and practice of pediatric Nephrology*. Jaypee Brothers: New Delhi 2004;167-78.
8. Sulyok E. Acute proliferative glomerulonephritis. In: Avner ED, Harmon WE, Niaudet P (Eds). *Pediatric nephrology*, 5th edition. Philadelphia: Lippincott Williams and Wilkins; 2005. pp.601-14.
9. Gunashekar K, Krishnamurthy S, Mahadevan S, Harish BN, Kumar AP. Clinical characteristics and outcome of post-infections Glomerulonephritis in children in Southern India. *Indian J Pediatr*. 2015;82:896-903.
10. Manhas et al acute glomerulonephritis in Kashmir children – clinical and epidemiological profile 1978.
11. Sarala Rajaji – post streptococcal acute glomerulonephritis a clinical, bacteriological and serological study – *Indian journal of paediatrics* 1990:775-780.
12. Poon-king T, Mohammad I, Cox R. *New England journal med* 21967;77:728.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 23-09-2017; **Accepted:** 21-10-2017; **Published:** 01-11-2017