

# Clinico-Biochemical Evaluation of Nephrotic Syndrome in children

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## ABSTRACT

**Introduction:** Nephrotic syndrome characterized by massive proteinuria (albuminuria), hypoalbuminemia and edema and hyperlipidemia, is a common disorder encountered in children. It is a clinical entity having multiple causes. Present study was done to see the Clinico Biochemical evaluation of Nephrotic Syndrome in children admitted in the Department of Pediatrics Government General Hospital, Guntur

**Material and methods:** The present study included 50 cases of Nephrotic syndrome in children belonging to the age group of 2-12 years who attended department of Paediatrics, Government General Hospital, Guntur. A.P., during Aug 2016 to July 2017.

**Results:** The most affected group was 6 – 8 years age group (40%), male children were more affected (62%) than female children. Commonest presentation was relapse of nephrotic syndrome.

**Conclusions:** Almost all patients presented with insidious onset of edema, starting as facial puffiness and gradually spread to the whole body. The response to steroid treatment delayed in patients with marked reduction of serum albumin levels.

**Keywords:** Nephrotic syndrome, oedema, steroids

## INTRODUCTION

Nephrotic Syndrome is primarily a pediatric disorder and is 15 times more common in children than adults. Nephrotic Syndrome is a clinical entity characterized by massive proteinuria (Albumin), Hypoalbuminemia, edema, and hyperlipidemia. Although not commonly thought of as a part of the syndrome, sometimes hypertension, Hematuria, and Azotemia may also occur. Schreiner (1950) originally defined the nephrotic syndrome as a clinical entity having multiple causes and characterized by increased Glomerular permeability manifested by massive proteinuria and lipiduria with variable tendency towards edema, hypoalbuminemia and hyperlipidemia. Descriptive definition of Nephrotic Syndrome is Proteinuric hypoproteinemic edema.<sup>1,2</sup>

### Criteria

1. Proteinuria: > 40mg /m<sup>2</sup> / Hr (or) 50mg/Kg/day (or) >1 gram/m<sup>2</sup>/day.
2. Serum Albumin: < 2.5 gr/dL
3. Urinary Protein to Creatinine Ratio: >2
4. Serum cholesterol: > 250 mg/dL

International study of kidney diseases in children ISKDC published guidelines for Classification and Treatment of Nephrotic Syndrome in children.

In about 95% cases of Nephrotic Syndrome in children there is a primary Glomerular abnormality.<sup>3,4</sup> The remainders are caused by renal involvement in several diverse conditions.<sup>5,6</sup>

Rarely the disorder may be congenital when Syphilis and other intrauterine infections, account for the majority of such cases.

Study aims were to see the Clinico Biochemical evaluation of Nephrotic Syndrome in children admitted in the Department of Pediatrics Government General Hospital, Guntur with particular emphasis on serum proteins and cholesterol level and to study the relationship, if any between the Serum proteins and cholesterol levels and their correlation with therapeutic response in 50 cases of Nephrotic Syndrome.

## MATERIAL AND METHODS

The present study included 50 cases of Nephrotic syndrome in children belonging to the age group of 2-12 years admitted in the Department of Paediatrics, Government General Hospital, Guntur, A.P during the period Aug 2016- July 2017.

Selection of cases was done according to the criteria of Nephrotic syndrome i.e. Anasarca (edema), Proteinuria, Hypoproteinemia, and Hypercholesterolemia, taking Proteinuria and edema as essential features. The other causes of edema like CHF; Hepatic causes are excluded in this study. Patients presenting with macroscopic hematuria and hypertension were also excluded in this study.

The following particulars were noted after admission, in the prescribed proforma.

## STATISTICAL ANALYSIS

Microsoft office 2007 was used for the analysis. Descriptive statistics like mean and percentages were used to interpret the results.

## RESULTS

In the present study, the age incidence of Nephrotic Syndrome is presented in table-1.

The youngest child present in this study was 1.9 year old male child and oldest was 12 year old male child. Most of the children were in age group between 2 – 8 years – 38 cases (76%). Average age presentation was 6.7 years.

In this study, there was male preponderance and noted M:F ratio was 1.6:1.

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**How to cite this article:** P. Anil Kiran, B. Deeva Kumar. Clinico-biochemical evaluation of nephrotic syndrome in children. International Journal of Contemporary Medical Research 2017;4(10):2214-2217.

Age in years	No. of cases	Percentage
2 – 5	18	36%
6 – 8	20	40%
9 – 12	12	24%

**Table-1:** Age wise distribution of Nephrotic syndrome

	No. of cases	Percentage
Initial	18	36%
Relapse	32	64%

**Table-2:** Type of presentation

Clinical features	No. of cases	Percentage
Anasarca	48	96%
Scrotal edema	16 out of 31 males	51.61%
Oliguria	20	40%
Ascites	45	90%
Pleural effusion	15	30%
Respiratory distress	5	10%

**Table-3:** Mode of presentation

Investigation	No. of cases	Percentage
1. Proteinuria	46	92%
2. Hypercholesterolemia	43	86%
3. Hypercholesterolemia	45	90%
4. Elevated Blood urea	3	6%
5. Anaemia	35	70%

**Table-4:** Laboratory data of Nephrotic syndrome in this study

Duration of the illness (edema) at the time of presentation was 5 days and maximum is 30 days with average duration of illness is 14.7 days.

Most of the cases that come later were treated earlier by different doctors or by native medication, Ayurveda, Homeo medication with out any improvement.

#### Mode of presentation

All the cases were brought with generalized edema starting around the eyes, which spread gradually to whole body. Scrotal edema was seen in 16 out of 31 males (51.61%).

#### Ascites

Ascites was found in 45 cases out of total 50 patients (90%).

#### Oliguria

Oliguria was found in 20 out of total 50 patients (40%).

#### Pleural effusion

Pleural effusion was found in 15 cases – 30% cases.

#### Signs of Respiratory Distress

Seen in 5 cases (10%) due to tense ascites.

#### Clinical status

Out of the 50 cases studied in the hospital initial attack cases were 18 (36%) and remaining of 32 (64%) cases were with relapse, with or without proper treatment. Two cases were proved to be steroid dependant and these cases were treated with Levamisole and alternate day Low dose prednisolone for one year.

#### Proteinuria

24-hour urinary protein estimation in this study ranges from 125mg to 2.85 gr.

#### Hypoproteinemia

Hypoproteinemia (serum Albumin <3.0 Gm) was seen in 43 cases (86%) and serum total proteins range from 2.7 gm/dl to 6.6 gm/dl.

#### Hypercholesterolemia

Serum cholesterol levels above the level of 250 mg/dl was found in 45 cases (90%). Minimum value was 172 mg/dl and Maximum of 800 mg/dl.

#### Anemia

35 cases out of 50 showed decreased Hb% relative to age group (70%)

#### Blood urea and Serum creatinine:

Blood urea was elevated in 3 cases with out concomitant rise of S.Creatinine (6%) in this study, suggestive of hypovolemia

#### Urinary tract infection

Urinary tract infection was proved by culture in one case (2%) and was treated with appropriate antibiotic based on culture report before starting the treatment.

#### Tuberculosis

TB was diagnosed in 2 (4%) cases and ATT was started before initiation of steroid therapy.

#### Cellulitis

Cellulitis of the lower limb was found in 2 cases (4%) and was treated with Intravenous antibiotics before starting treatment.

#### Steroid toxicity

Complications associated with steroid was noted only after 4 -6 weeks of steroid therapy. It was observed in 3 cases in the form of cushingoid facies and subsided after cessation of steroid therapy.

## BIOCHEMICAL OBSERVATIONS WITH CORRELATION TO CLINICAL STATUS AND REMISSION

#### Serum Albumin Vs time taken for remission

Out of the 50 cases, Who responded to daily steroid therapy, attempt has been done to correlate between Serum Albumin levels and clinical remission.<sup>7</sup>

The response to steroid therapy is delayed in those patients with markedly reduced serum albumin levels. It is noted that with increasing S.Albumin levels, the time taken for Remission is decreased. So an inverse relationship is found between S.Albumin levels and the time taken for remission.<sup>8</sup>

#### Serum Cholesterol vs time taken for remission

Response to steroid therapy is delayed in those patients with markedly elevated S.Cholesterol levels, which is an indirect indicator of elevated S.Lipoprotein. It was also observed that lower the cholesterol levels, quicker the response to steroids. With progressive increase in serum cholesterol it is noticed that there is progressive delay in the remission

It is observed that the cholesterol levels are high in those with S.Albumin levels are < 2.0gm/dl. As the S.Albumin levels are increasing, the corresponding levels of cholesterol in decreasing.

## DISCUSSION

Nephrotic syndrome is a clinical entity of diverse causes with increased permeability of glomerular basement membrane as the common denominator

It is one of the common pediatric problems, which still presents a challenge to the Pediatrician regarding the management and indicating precise prognosis. The introduction of cortisone in to the clinical use of nephrotic syndrome in 1949 brought a remarkable change in the outlook for the children affected with this disease.

### Age and Sex

In the present study of 50 cases of Nephrotic syndrome majority belong to the age group between 2 – 8 years. From the study of Dajani. T. et al it can be observed that prevalence was more between 2 – 6 years, thus the present study correlates with it.

In the present study of 50 cases of Nephrotic syndrome 31 cases were (62%) males; this is in accordance with studies of ISKDC, Covadia, and Srivasthava et al which showed male preponderance in Nephrotic syndrome.

Male: Female ratio in the present study was 1.6:1.

### Preceding illness

Some times the initial episode and majority of relapses appear to be precipitated by various infections. Present work shows associated infection and commonest being URI is found in 70% of cases. Similar results were seen in Manchand reports, where as Chowdary et al reported URTI in 40% cases.

### Anaemia

Anaemia was found in significant number of cases i.e. 35 cases (70%), unlike western series, which showed elevated levels of hemoglobin and haematocrit values because of hemoconcentration. All the cases were investigated with peripheral smear and found iron deficiency anemia, and treated with iron 6mg/kg/day and responded well.

### Tuberculosis

Tuberculosis was detected in 2 cases (4%) in the present study. These cases showed initial delayed response to steroid therapy

### Renal Function tests

Elevated blood urea levels was found in 3 cases without rise in S.Creatinine levels., this is probably due to pre renal azotemia due to hypovolemia. The elevated levels of blood urea came down to normal levels after steroid induced remission. Thus the initial rise is probably attributed to the reversible ARF described in Nephrotic syndrome (Rector and Brenner)

### Hypercholesterolemia

Hypercholesterolemia above 250 mg/dl was found in 45 cases (90% in the present study. It is in close to Brenner and

Cameron study and Mallick study.

### Hypoproteinemia

Majority of the cases showed marked reduction in total serum proteins and albumin. Levels of total serum protein and albumin are very low in cases with severe degree of edema. Squire et al reported similar results. In the present study, it is observed that the onset of remission in steroid response group is delayed in those patients with severe degree of hypo albuminemia; this is in accordance with the study conducted by De Maya and Smith, Gerald.B.Appell, and Conrod. B.Blum (American society of Nephrology Journal dated 1990)

Patients with two biochemical abnormalities i.e. raised cholesterol levels and decreased albumin levels showed delayed response to steroids when compared to patients not having either of these abnormalities. This relation between the S.Cholesterol level and clinical remission is in accordance with the studies conducted by Bhandari et al, Benkappa et al and Shaky et al.

Thus plasma protein study and serum cholesterol analysis will help in finding the relationship between the prevalence and severity of Hyperlipoproteinemia and severity of Nephrotic syndrome and many also be helpful in indicating the prognosis.

### Correlation between S.Albumin levels and cholesterol

In the present study there is an inverse relationship between serum albumin levels and hyper cholestroemia. This is due to, more the Hypoalbuminemia; more will be the stimulus to liver for lipoprotein synthesis.

This inverse correlation between these two is also described in studies conducted by K.P.Mehatha, N.Bhaktal et al (I.A.P.Dec 1990) and Shu chin and Gerald B. Appell (Journal of American Society of Nephrology Dec 1989, Kaysen and Bander (1990).

### Response to treatment

All cases responded to steroids with in 3 weeks with average time taken for remission is around 10 days.<sup>9</sup>

## CONCLUSION

A Hospital based study of 50 cases of Nephrotic syndrome admitted in Dept of Pediatrics Government General Hospital, Guntur, A.P during the Period Aug 2016 – July 2017 is presented in its clinical and biochemical profile. Response to steroid was studied in reference to the serum albumin level and serum cholesterol levels. Literature was reviewed and present study was compared with earlier studies on the subject.

Following conclusions were drawn from the present study

1. There was male predominance in childhood Nephrotic syndrome.
2. 2 – 8 years is the commonest age group affected in this study.
3. Preceding illness is recorded in 70% of cases and URI being the Commonest.
4. Almost all patients presented with insidious onset of

edema, starting as facial puffiness and gradually spread to the body.

5. The response to steroid treatment was delayed in patients with marked reduction of Serum Albumin levels.
6. The onset of remission is also delayed in patients with marked elevation of Serum Cholesterol levels.
7. Inverse correlation was observed between levels of S. Albumin and Serum Cholesterol levels.
8. Complications of steroid treatment are mild and disappeared after Gradual withdrawal.

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

**Submitted:** 11-10-2017; **Accepted:** 09-11-2017; **Published:** 22-11-2017