Significance of Biochemical Difference between Childhood Nephrotic Syndrome with UTI and without UTI

Kazi A.S.M Shamim Parvez\(^1\), Md. Khalilur Rahman\(^2\), Md. Razikul Islam\(^3\), Md. Sanaul Haque\(^4\).

**Abstract**

**Background:** Nephrotic syndrome is one of the most common renal diseases in childhood and infection is one of the most important complications in this disease. Infection increases the mortality and morbidity of this type of patients. Most common infection is UTI. So through this study we can able to determine biochemical difference between childhood nephrotic syndrome with Urinary Tract Infection (UTI) and without UTI patients and its clinical significance. **Objective:** To determine the biochemical difference in childhood nephrotic syndrome patients and its relation with urinary tract infection. **Materials and Methods:** It is a prospective study done in pediatric department in Rajshahi Medical College Hospital, 60 patients of both sex age between 1-12 years, diagnosed as idiopathic nephrotic syndrome with and without UTI were included in this study. Data collection was done by history taking, clinical examination, laboratory investigations and followed up. Patients were followed up till cure of UTI and remission of proteinuria. After data collection statistical analysis were done by computerized software. **Results:** In our study we found there were biochemical differences between childhood nephrotic syndrome with UTI and without UTI patients. In patients of nephrotic syndrome with UTI serum albumin decrease significantly and serum cholesterol increase significantly than nephritic syndrome without UTI patients. **Conclusion:** Child with nephrotic with UTI patients had lower serum albumin and higher serum cholesterol than nephrotic syndrome without UTI patients and it affects morbidity mortality of this patients.

**Keywords:** Urinary Tract Infection, Nephrotic Syndrome.

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**Introduction**

Nephrotic Syndrome is one of the most common renal disease in childhood. The annual incidence of nephrotic syndrome in US range from 2-7 new cases in children under 16 years per lac children.\(^1\) Infection is one of the most important complication in childhood nephrotic syndrome.\(^2\) The cause of infection due to: (i) Loss of plasma protein, (ii) Decrease serum immunoglobulin level, (iii) Abnormal functions of T-cell, (iv) Hypoperfusion of spleen, (v) Oedematus fluid which acts as a good source of bacterial growth, (vi) Immunosuppressive drugs which are used in treatment of disease. Infection cause the mortality of patient, it also result significance morbidity of patient. It also causes the poor responses of drug and relapse of proteinuria. So infection is an important factor which effect the mortality and morbidity of patient in childhood nephrotic syndrome.\(^7\)

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1. Associate Professor, Pediatric Nephrology, Rajshahi Medical College, Rajshahi, Bangladesh.
2. Assistant Professor, Neonatology, Rajshahi Medical College, Rajshahi, Bangladesh.
3. Assistant Registrar, Pediatrics, Rajshahi Medical College Hospital, Rajshahi, Bangladesh.
4. Professor & Ex-Head, Rajshahi Medical College, Rajshahi, Bangladesh.

**Correspondence:** Dr. Kazi A S M Shamim Parvez, Associate Professor, Pediatrics Nephrology, Rajshahi Medical College, Rajshahi, Bangladesh. Email: kazishamim63@gmail.com, Cell: +8801712566164
children, urinary tract infection (UTI) are of special interest because of their association with vesicoureteric reflux and predisposed for long term renal damage. Recurrence and sequelae are common in childhood nephrotic syndrome with urinary tract infection. So UTI in nephrotic syndrome is not only the underlying cause of non response to therapy and relapse but also may induce long term renal damage. In study of shenguttuvan, Revanan et al found that children of nephrotic syndrome with UTI had significantly higher serum cholesterol and lower serum albumin than children of nephrotic syndrome without UTI. According to the study of Raj, Kumar et al. There were high serum cholesterol and low serum albumin in children with nephrotic syndrome with UTI.

So infection is an important factor which effect the mortality and morbidity of patient in childhood nephrotic syndrome. and serum cholesterol and serum albumin are two important factors for development of UTI in children with nephritic syndrome.

Materials and Methods

It is prospective study, done in department of paediatric in Rajshahi Medical College Hospital between July 2017 to December 2017. The sample size was 60 in number. Patient of both sex, age between 1-12 years, diagnosed as idiopathic nephrotic syndrome with Urinary Tract Infection (UTI) and without UTI were included in this study. Nephrotic syndrome was diagnosed according to International Study of Kidney Disease in Children (ISKDC) criteria like oedema, urinary protein excretion >1gm/ /day body surface area, serum albumin <2.5 gm/dl, serum cholesterol > 200 mg/dl and on heat coagulation test urinary protein > 2+. The patient of nephrotic syndrome associated with systemic manifestation and infections other than UTI were excluded from this study. For diagnosis of UTI following criteria are considered like fever, anorexia, abdominal pain, vomiting, dysuria in urine R/E significant pus cell >105 /ml present and urine culture were positive for bacteria.

After taking written consent from patients or legal gardin data were collected by data collection sheet which included age, sex of patients, presenting complaints like swelling of body, scanty micturation, fever, dysuria and by general and systemic examination, laboratory investigations and followed up. Patient of nephrotic syndrome with UTI first treated with appropriate antibiotics until followed up culture revealed no growth. After that definitive treatment of nephrotic syndrome were given according to Association for Pediatric Nephrology (APN) protocol that is initial attack 60 mg/m2/ day for 6 weeks followed by 40mg/ m2/ alternate day for 6 weeks. Patient were followed for cure of UTI and remission of proteinuria.

After collection of data statistical analysis were done by computerized soft were. Statistical significance was determined by chi-square and Z test. P-value ≤ 0.05 was taken as minimum level of significant.

Results

| Table - I: Age and sex distribution of patients. |
| Factors | Number of patients | Percentage |
| Age | (Total patients 60) |
| <6 yr. | 42 | 70.0% |
| >6 yr. | 18 | 30.0% |
| Sex | |
| Male | 43 | 71.6% |
| Female | 17 | 28.4% |

Out of 60 patients, 43 patients were male and 17 patients were female. M:F = 2.5 : 1 Regarding age of nephrotic syndrome patients, out of 60 patients 42 patients were below 6 years and 18 patients were between 6-12 years of age. Mean age was 5.6 years. More patients were lower age group (Table I).

| Table – II : Number of UTI patients (n-60) |
| No. of patients | Percentage | P Value |
| With UTI | 37 | 61.6 | |
| Without UTI | 23 | 38.3 | <0.01 |

Out of 60 patients UTI developed in 37 patients and no UTI developed in 23 patients. In statistical analyzes Z = 2.72  & P < 0.01 (Table- II).

| Table-III : Common presentation of UTI |
| Clinical feature | No of patients | Percentage |
| Fever | 31 | 83.7 |
| Pain in abdomen | 21 | 56.7 |
| Dysuria | 11 | 29.7 |
| Hematuria | 7 | 18.9 |
| Anorexia | 28 | 75.6 |
| Vomiting | 7 | 18.9 |
| Tender abdomen | 13 | 35.1 |
| Tenderrenalangle | 6 | 16.2 |

Table III: shown the common presentation of UTI in NS patients. Out of 37 patient in nephrotic syndrome with UTI, 31 patients presented with fever. Pain in abdomen and dysuria presented in 21 and 11 number of patients respectively.
Hematuria, anorexia presented in 7 and 28 number of patients respectively. Vomiting and tender abdomen developed in 7 and 13 number of patients, respectively only 6 patients developed tender renal angle.

Table IV: Laboratory findings of urine in UTI patients (n=42).

| Variable                  | UTI n=37 | N/UTI UTI n=23 |
|---------------------------|----------|----------------|
| Blood urea mg/ml          | 22 ± 0.72| 21 ± 0.25      |
| S. creatinine mg/dl       | 1 ± 0.2  | 1 ± 0.3        |
| S. TP (gm/dl)             | 6 ± 1    | 6 ± 0.9        |
| S. albumin (gm/dl)        | 1.8 ± 0.5| 2.5 ± 0.6      |
| S. Cholesterol mg/dl      | 300 ± 2  | 250 ± 2        |
| 24 UTP mg/m2/dy           | 65 ± 2   | 65 ± 2         |

Table IV: shown the laboratory findings of urine in UTI patients. In microscopic examined of urine pus cell found in 34 patients out of 37 patients. RBC found in 12 patients and bacteria found in 35 patients.

Table-V: Comparism of biochemical values between nephrotic syndrome with UTI and nephrotic syndrome without UTI patients.

| Variable     | UTI n=37 | N/UTI UTI n=23 | P value |
|--------------|----------|----------------|---------|
| Albumin gm/l | 1.8 ± 0.5| 2.5 ± 0.6      | <0.01   |
| Cholesterol mg/dk | 300 ± 2 | 250 ± 2 | <0.01 |
| 24 UTP mg/m2/dy | 65 ± 2  | 65 ± 2 | <0.01 |

Table-V: Shown the biochemical difference between nephrotic syndrome with UTI and without UTI cases. Here found in nephrotic syndrome with UTI patients albumin decreases significantly (P value <0.05) and S. cholesterol increases significantly (P value <0.01) than nephrotic syndrome without UTI cases.

Table VI: Remission of proteinuria of nephrotic syndrome patients with and without UTI (n=60)

| Duration | with UTI | without UTI | P value |
|----------|---------|-------------|---------|
| <2 weeks | 13(35.1%) | 17(73.9%) |         |
| >2 weeks | 24(64.8%) | 6(26%) | <0.01   |
| Total    | 37       | 23          |         |

Table VI: shown here remission of proteinuria of NS patients with and without UTI. Out of 37 nephrotic syndrome patients with UTI remission occurred within 2 weeks in 13 patients and remission occurred after 2 weeks in 24 patients. In case of without UTI of NS out of 23 patients remission of proteinuria occurred within 2 weeks in 17 patients and after 2 weeks in 6 patients. In statistical analysis p=8 and p<0.01.

Discussion

Nephrotic syndrome represents an immuno compromised state predisposing to various types of infections. Infections remain main cause of hospitalization of patients, also cause the recurrence of proteinuria, poor response to steroid therapy and even death of patients. Most common type of infection is UTI nephrotic syndromes. In this study we have analized the biochemical differences between nephrotic syndrome with UTI and without UTI and its significance. In present study, regarding sex, male preponderance was noted, 71.6% Male preponderence also reported by Hossain, Ara et al. about 60%. So our study almost similar to this study. Out of 60 patients, the age of 42 (70%) patients were less than 6 years & 18 (30%) patients were more than 6 years. Mean age was 5.6 years. Though nephrotic syndrome may occur in any age, but childhood idiopathic nephrotic syndrome occurs mostly between age of 2-6 years about 80%. So our study also similar to this study. The prevalence of UTI in our study found 61.6% of nephrotic syndrome which is consistent with previous studies 63% by Gulati, Gupta et al., 65.20% by Karim. So our study also similar to this study.

In clinical presentation of UTI we had found fever in 31 (83.7%) cases, pain in abdomen in 21 (56.7%) cases, dysuria in 11 (29.7%) cases, hematuria in 7 (18.9%) cases, anorexia in 29 (79.6%) cases, vomiting in 7 (18.9%) cases, tender renal angle in 6 (16.2%) cases and tender abdomen in 13 (35.1%) cases. According to Srivastava and Bagga common clinical presentation of UTI are fever about 80% flank pain about 40% also may found dysuria. Occasionally may found hematuria. According to Postlethwaite and Nicholas typical presentation of UTI are dysuria, loin pain and generalized symptoms like fever, anorexia, abdominal pain, vomiting. So our study in consistent with these findings.

According to Avner, Harmon et al. in routine urine examination found pus cell and RBC. Pus cell found in 80-90% and RBC found in 20-30% of symptomatic UTI patients. In our study in microscopic urine routine examination 80% of patients we had found pus cell and 28% RBC. According to Avner Harmon et al. in 80% UTI patients urine culture for bacteria is positive and 20% is negative. This negativity due to low bacterial growth or use of antibiotics before culture. In our study in urine culture we had found 83% cases positive and 17% cases were negative. So our study almost similar to this study. In biochemical parameters of nephrotic syndrome with UTI shown that serum albumin were significantly lower (1.8 gm/ml, P<0.05) and S. cholesterol were significantly high (300 gm/ml, P<0.01) than the Nephrotic syndrome without UTI. This type of biochemical change also found in study by Gulati kher et. al. So the study...
is supported our study. Hypercholesteremia may have direct role in precipitation of infection as it inhibit the lymphocyte function. Hypoalbuminemia also precipitate infection due to loss of body immunity.

Out of 60 patients 37 patients were with UTI and 23 patients were without UTI. Out of 37 patients of UTI remission occurred before 2 wks 13 patients (35.2%), after 2 weeks 24 patients (64.8%) and out of 23 non UTI patients remission of proteinuria occurred before 2 weeks 17 patients (73.9%) and after 2 weeks 6 patients (26.1%). On statistical analysis \( \chi^2 = 8 \) and \( p<0.01 \). So it is statistically significant. So UTI may delay remission of proteinuria in childhood idiopathic nephrotic syndrome. According to Emalia Koch et al. UTI may delay the remission of proteinuria in childhood nephrotic syndrome. According to Srivastava and Begga that infection cause immune dysfunction, increase filtration of protein in glomerular basement membrane and thus increase proteinuria result in delayed remission. So these study consistent with these previous study.

**Conclusion**

Considering above all finding it may be concluded that there is significant biochemical different between childhood nephrotic syndrome with UTI and without UTI patients and UTI may effect the morbidity and mortality of these patients. So by proper treatment of UTI we may reduce the duration of proteinuria and thus reduce the mortality and morbidity of patients in childhood idiopathic nephrotic syndrome.

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**References**

1. Chun J, Habib R, White RHR. Pathology of the Nephrotic Syndrome in children. A Report for the International study of Kidney Disease in Children. Lancet, 1970;1:1299-1302.

2. Overturf GD and committee of infectious diseases. Technical Report: Prevention of pneumococcal Infections. Including the use of pneumococcal conjugate and polysaccharide thaid vaccincs and amitotic prophylaxis. Journal of paediatrics. 2000; 106: 367-376.

3. Gulati S, Kher V, Gupta S. et al. Urinary tract infection in nephrotic syndrome. pediatr infect dis J mar; 1996; 15(3): 237-240.

4. Demaria WI, Krueger RP, Anderson EE. Urinary tract anomalies in nephrotics syndrome. Clin peditr. 1972; 11(9): 530-533.

5. Shenguttuvan P, Ravanak K, Prabhu N. et al. Infections encountered in childhood nephrotic in pediatric renal unit. Indian J nephrol 2004;14: 85-88.

6. Raj US, Kumar H, Jumar O, et al. Covert Bacteriouria in nephrotic syndrome, Indian J Pathol Microbiol. Jan : 2002;45 (1): 49-51

7. Postlethwaite RJ and Nicholas. Child with UTI, Clinical pediatric nephrology. ed 3rd Oxford University press New York, 2003; 197-220.

8. Hossain M.M, Ara H, Khan M.R. A study of Nephrotic Syndrome in children in IPGMR Bang. J. of Child Health; 1982; 6(1): 25-28.

9. Mc Adams AJ, Valenti RP. Welch TR. The non specificity of focal segmental glomerulosclerosis: The defining characteristics of primary focal glomerulosclerosis, Mesangial Proliferation and minimal change, Medicine. 1997;76:42-52.

10. Karim A. Risk factors for relapse in childhood nephrotic syndrome. -a hospital based prospective study. Dhaka-Bangladesh College of Physicians and surgeon (Dissertation) 1999.

11. Chowdhrury MA. Pattern of infection in children with nephrotic syndrome-a hospital based prospective study. Dhaka: Bangladesh College of Physicians and Surgeons, 63-66 1996; 63-66

12. Srivastava RN and Begga A. Nephrotic Syndrome. Paediatric Nephrology 4th edition, Jaypee Brother’s Medica Pub. Ltd. New Delhi, 2005; 160-200.

13. Avner E.D, Harmon W.E, Niaudet P. Steroid sensitive idiopath nephrotic syndrome in children. Paediatric Nephrology 5th ed, Lippincott Williams and Wilings, Philadelphia USA. 2004;543-556.

14. Emilia M.D, Koch V.H Fujimura M.D, et al. Influence of nephrotic state on infection profile in childhood NS. Rev hospital clinic Fac Med Sao paulo, Brazil, 2004; 59 (5), 273-278.

15. Barnett HL, Edelmann CM, Greifer I, et al. MCNS in children, death during first 5-15 years observation. Report ISKDC Paediatrics, 1984; 73: 497-501.