

Original Article

Urinary Tract Infection in Nephrotic Syndrome - A study of 62 cases at Faridpur Medical College Hospital

LC Kundu¹, AK Saha², MK Hassan³, A Kundu⁴

Abstract:

Urinary tract infection is a common complication of Nephrotic syndrome, many cases remain asymptomatic. This study was aimed to determine the possible underlying causes of urinary tract infection in Nephrotic syndrome. The study population in this descriptive study included children aged six months to fourteen years old with Nephrotic syndrome referred to Paediatric ward of Faridpur Medical College Hospital from June 2015 to March 2016. The mean age was 6.12 ± 3.25 years in UTI group and 7.26 ± 3.39 years in without UTI group. Male were predominant in both groups, 15(60.0%) in UTI group and 24(64.9%) in without UTI group. Serum albumin, total protein, urinary protein excretion, the number of white blood cells, hemoglobin, erythrocyte sedimentation rate, blood creatinine, nitrogen, blood urea, serum triglycerides were not statistically significant between the groups. The most common microorganisms involved in urinary tract infection were: *Escherichia coli* (13%) & *Klebsiella* (13%). Majority 29(46.8%) patients had fever, 12(19.4%) had diarrhea, 11(17.7%) had bad smell of urine, 10(16.1%) had vomiting associated with diarrhea and 10(16.1%) had respiratory symptoms. Children with nephrotic syndrome are frequently predisposed to urinary tract infection and in most cases it is asymptomatic, often undiagnosed. *E. coli* is the commonest organism causing UTI.

Key words: Nephrotic Syndrome, UTI.

Introduction:

Nephrotic syndrome is the most common chronic glomerular diseases in children. The most common infection in children with nephrotic syndrome is urinary tract infection¹. The incidence of this syndrome in children is 2-7 cases per 100.0000². Most cases of nephrotic syndrome (90%) are the idiopathic type. The remaining 10% have secondary nephrotic syndrome due to glomerular disease or systemic diseases³.

The most common infection in children with nephrotic syndrome is urinary tract infection (UTI)⁴. Urinary tract infection is the second most common bacterial disease in children after upper respiratory tract

infection and it is the most common bacterial infection that affects humans throughout life⁵. Symptoms of urinary tract infection are different regarding age and the younger a child is, the more non-specific are these symptoms⁶. Infection is one of the most important complication in nephrotic syndrome specially in developing countries as ours. Being the commonest cause of mortality, infection results in poor response to steroid and frequently results in relapse in a child who has already attained remission^{7,8}. Infection in nephrotic syndrome may be vague or non-specific which may delay early diagnosis having various effects on patient with nephritic syndrome⁹.

Materials and Methods :

This descriptive study was conducted in the pediatric ward of Faridpur Medical College Hospital from June 2015 to March 2016. Urine specimen (after washing the perineum) in children who had bladder control were collected using urine midstream and in children without bladder control, the specimen were preferably collected using supra-pubic or catheter method and in the event of failure, the specimen were collected from urine bag and were immediately sent to the laboratory to perform the complete urinalysis and urine culture. If urinalysis report included positive pyuria or nitrite, the early test

1. Dr. Lakshman Chandra Kundu, MBBS, DCH, MD, Associate Professor of Paediatric Nephrology, Department of Paediatrics, Faridpur Medical College, Faridpur.
2. Dr. Aloke Kumar Saha, MBBS, FCPS, Professor & Head, Department of Paediatrics, Faridpur Medical College, Faridpur.
3. Dr. Md Kamrul Hassan, MBBS, DCH, Junior Consultant (Paediatrics), Department of Paediatrics, Faridpur Medical College Hospital, Faridpur.
4. Dr. Antara Kundu, MBBS, Intern doctor, Shaheed Suhrawardy Medical College, Hospital, Dhaka.

Address of correspondence :

Dr. Lakshman Chandra Kundu, MBBS, DCH, MD, Associate Professor of Paediatric Nephrology, Department of Paediatrics, Faridpur Medical College, Faridpur.
Mobile No: +88-01711468536, E-mail: lkundu@gmail.com

was considered active and when the number of microorganisms of a species in the specimen of urine midstream was more than 10^4 , urine cultures was considered positive and in case the catheter specimen microorganisms were more than 10^3 , any bacterial growth in culture as well as supra-pubic samples were considered positive. Obviously, the diagnosis of urinary tract infection in children is confirmed when urinalysis is consistent with urine culture results. Children six months to 14 years of age with nephrotic syndrome, avoiding the use of any oral antibiotics and injection 48 hours before laboratory test were included and children less than 6 months and more than 14 years and prior antibiotics consumption were excluded from this study. To collect and record the required data, a questionnaire was used that asked about the history, reason for referral and laboratory tests. The gathered data was entered in SPSS software and to describe the data, frequency tables, statistical indicators and diagrams were used. To analyze the relationships between variables, related tests including the chi-square test, t-test were used.

Results :

Majority patients belonged to age 1-2 years in both UTI and without UTI group. The mean age was 6.12 ± 3.25 years in UTI group and 7.26 ± 3.39 years in without UTI group. The difference was not statistically significant between the groups (Table-I). Male were predominant in both groups, 15(60.0%) in UTI group and 24(64.9%) in without UTI group. The male, female difference was not statistically significant between the groups (Table-II).

Table I: Distribution of the study patients by age (n=62)

Age	UTI (n=25)		Without UTI (n=37)		P value
	n	%	n	%	
6-12 months	7	28	5	13.5	
1-2 years	10	40	13	35.1	
<2-8	6	24	10	27.0	
>8	2	8	9	24.3	
Mean±SD	6.12±3.25		7.26±3.39		0.191 ^{ns}

Table II: Distribution of the study patients by sex (n=62)

Sex	UTI (n=25)		Without UTI (n=37)		P value
	n	%	n	%	
Male	15	60.0	24	64.9	0.697 ^{ns}
Female	10	40.0	13	35.1	

ns=not significant. p value reached from Chi square test

Regarding clinical profile of the patients it was observed that asymptomatic were 68.0% and symptomatic were 32.0% (Figure-I). Serum albumin, total protein, urinary protein excretion, the number of white blood cells, hemoglobin, erythrocyte sedimentation rate, blood creatinine, nitrogen, blood urea, serum triglycerides were not statistically significant between the groups. Mean serum cholesterol in nephrotic syndrome with UTI patients was 457 mg/dl (± 175.0) which is significantly higher than that of children without UTI in whom it was 370.0 mg/dl (± 145.0) that was statistically significant ($p < 0.05$) (Table-III). Table III shows serum albumin, total protein, urinary protein excretion, the number of white blood cells, hemoglobin, erythrocyte sedimentation rate, blood creatinine, nitrogen, blood urea, serum triglycerides were not statistically significant between the groups. Mean serum cholesterol in nephrotic syndrome with UTI patients was 457 mg/dl (± 175.0) which is significantly higher than that of children without UTI in whom it was 370.0 mg/dl (± 145.0) that was statistically significant ($p < 0.05$).

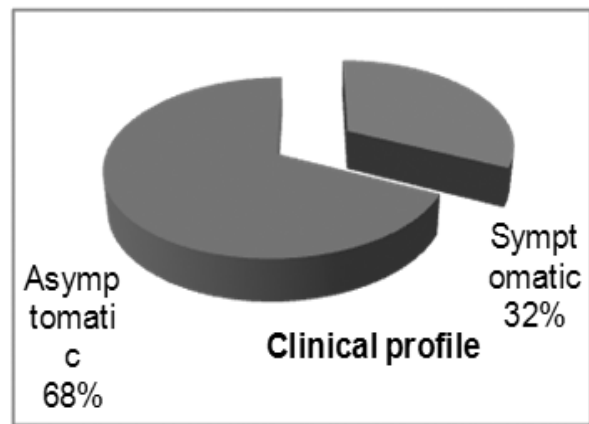


Figure 1: Pie chart showing clinical profile of the patients

Regarding clinical profile of the patients it was observed that asymptomatic was 68.0% and symptomatic was 32.0%.

Nephritic syndrome with mild scar (nsms) was common in both groups, which was 11(44.0%) in UTI group and 18(48.6%) in without UTI group. Microscopic examination of urine showed pyuria in 64.0% in nephrotic syndrome with UTI patients and in 54.1% in nephrotic syndrome without UTI (p value > 0.05 , not significant). Microscopic hematuria was found in 32.0% of UTI patients & in 16.2% of without UTI patients that was not statistically significant

(p value >0.05) (Table-IV). The results of this study showed that the most common microorganisms involved in urinary tract infection are: *Escherichia coli* (13%), *Klebsiella* (13%), *Enterococcus* (6%), *Proteus* (4%) and other microorganisms (4%) (Table-V). Majority 29(46.8%) patients had fever followed by 14(22.6%) had seizures due to fever, 12(19.4%) had diarrhea, 11(17.7%) had bad smell of urine, 10(16.1%) had vomiting associated with diarrhea and 10(16.1%) had respiratory symptoms (Table-VI).

Table III: The parameters in patients with Nephrotic syndrome (n=62)

Parameters	UTI (n=25)		Without UTI (n=37)		P value
	Mean	±SD	Mean	±SD	
Serum Albumin (gm/dl)	2.17	±0.61	2.03	±0.47	0.321 ^{ns}
Serum total protein (g/day)	4.67	±0.69	4.66	±0.67	0.954 ^{ns}
Urinary protein excretion (g/day)	4245	±3963	4959	±4760.0	0.538 ^{ns}
The number of white blood cells	9947	±2863	10859	±4765	0.394 ^{ns}
Hemoglobin (g/dl)	12.9	±1.87	12.2	±1.9	0.195 ^{ns}
Erythrocyte	75.0	±33.0	67.0	±42.0	0.427 ^{ns}
Sedimentation rate (mm/h)					
Blood creatinine (mg/dl)	63.0%	±0.23	75.0%	±44.0%	0.178 ^{ns}
Nitrogen, blood urea (mg/ dl)	16.51	±0.47	17.6	±8.68	0.534 ^{ns}
Serum triglycerides (mg/dl)	337.0	±194.0	439.0	±205.0	0.054 ^{ns}
Serum Cholesterol (mg/dl)	457.0	±175.0	370.0	±145.0	0.044 ^s

Table IV: Distribution of microscopic hematuria and pyuria among the study groups (Group A: Nephrotic syndrome with UTI, Group B: Nephrotic syndrome without UTI). (n=62)

	UTI (n=25)		Without UTI (n=37)		P value
	n	%	n	%	
Pyuria					
Significant	16	64.0	20	54.1	0.436 ^{ns}
Not significant	9	36.0	17	45.9	
Microscopic hematuria					
Significant	8	32.0	6	16.2	0.144 ^{ns}
Not significant	17	68.0	31	83.8	

ns=not significant. p value reached from Chi square test

Table V: Frequency distribution of UTI children with a variety of microorganisms in 62 children studied

Percent and the number of children with UTI	Type of isolated microorganisms
13%-16	<i>E. coli</i>
13%-16	<i>Klebsiella</i>
6%-8	<i>Enterobacter</i>
3%-4	<i>Proteus</i>
3%-4	ETC

The results of this study showed that the most common microorganisms involved in urinary tract infection are: *Escherichia coli* (13%), *Klebsiella* (13%), *Enterococcus* (6%), *Proteus* (4%) and other microorganisms (4%).

Table VI: Clinical symptoms of children with urinary tract infection

Clinical symptoms	Frequency	Percentage
Fever	29	46.8
Seizures due to fever	14	22.6
Diarrhea	12	19.4
Bad smell of urine	11	17.7
Vomiting associated with diarrhea	10	16.1
Respiratory symptoms	10	16.1
Jaundice	8	12.9
Seizures caused by meningitis	4	6.5
Vomiting associated with meningitis	4	6.5
Lethargy	4	6.5
Hepatosplenomegaly	4	6.5
Coma	2	3.2
Urinary retention	2	3.2

Discussion:

In current study, majority patients belonged to age 1-2 years in both UTI and without UTI group. The mean

age was 6.12 ± 3.25 years in UTI group and 7.26 ± 3.39 years in without UTI group. Similar observation was found in Salarzaei et al¹ study where they showed the average age of children without infection was 6.57 ± 3.18 years and in the infected group age was 5.48 ± 3.36 years. In a study by Derakhshan et al¹⁰. in Iran, the medical records of all children aged 1 to 10 years old with a clinical diagnosis of nephrotic syndrome who had at least 7 years of regular visits to the clinic, the age of the outbreak, sex, number of relapses, infection and damage were evaluated. Their findings showed that in the age group of 5.82 ± 2.24 years, urinary tract infection in females was more common. This reflects the impact of racial factors in the gender distribution of the disease. The recurrent urinary tract infection in the age group of 6 months to 8 years was significantly lower than the group aged 8-14 years ($P=0.001$).

In present study male were predominant in both groups, 15(60.0%) in UTI group and 24(64.9%) in without UTI group. The male, female difference was not statistically significant between the groups. In the study of Salarzaei et al¹ among 124 children with nephrotic syndrome 71 were males and 53 were females. Barua et al study observed that Male: Female ratio 1:1. In case of nephrotic syndrome without UTI (Group B), out of 36, 61.1% ($n=22$) were male and 38.9% ($n=14$) were female¹¹.

In our study regarding clinical profile of the patient it was observed that asymptomatic was 68.0% and symptomatic was 32.0% which is comparable to the study of Barua et al where 68.8% were asymptomatic¹¹.

In present study the serum albumin, total protein, urinary protein excretion, the number of white blood cells, hemoglobin, erythrocyte sedimentation rate, blood creatinine, nitrogen, blood urea, serum triglycerides were not statistically significant between the groups. Mean serum cholesterol in nephrotic syndrome with UTI patients was 457 mg/dl (± 175.0) which is significantly higher than that of children without UTI in whom it was 370.0 mg/dl (± 145.0) that was statistically significant ($p < 0.05$). Salarzaei et al showed that no significant difference was observed considering white blood count, hemoglobin level, erythrocyte sedimentation rate (ESR), the amount of creatinine (Cr), nitrogen, BUN, serum total protein and urinary protein¹. Barua et al study observed that the mean serum albumin was 2.14 gm/dl (± 0.58) in nephrotic children with UTI (Group A) patients and 2.02 gm/dl (± 0.45) in nephrotic children without UTI (Group B) patients that was not statistically significant (p value was >0.05)¹¹. Mean serum cholesterol in nephrotic syndrome with UTI (Group A) patients was 418.94 mg/dl (± 102.28) which is significantly higher

than that of children without UTI (Group B) in whom it was 352.03 mg/dl (± 24.05) that was statistically significant ($p < 0.05$). Gulati et al showed that UTI in nephrotic children is associated with lower serum albumin and higher serum cholesterol¹².

In present study microscopic examination of urine showed pyuria in 64.0% in nephrotic syndrome with UTI patients and in 54.1% in nephrotic syndrome without UTI (p value >0.05 , not significant). Microscopic hematuria was found in 32.0% of UTI patients & in 16.2% of without UTI patients that was not statistically significant (p value >0.05). This is consistent with observation of Rahman and Rahman where no association was also found in case of microscopic hematuria. Barua et al study showed pyuria in 62.5% ($n=10$ out of 16) nephrotic syndrome with UTI patients (Group A) and in 52.8% ($n=19$ out of 36) nephrotic syndrome without UTI (Group B) (p value >0.05 , not significant)¹¹. Microscopic hematuria was found in 31.2% ($n=5$ out of 16) of UTI patients (Group A) & in 16.7% ($n=6$ out of 36) of without UTI patients (Group B) that was not statistically significant (p value >0.05).

The results of this study showed that the most common microorganisms involved in urinary tract infection were: *Escherichia coli* (13%), *Klebsiella* (13%), *Enterococcus* (6%), *Proteus* (4%) and other microorganisms (4%). Salarzaei et al study observed that the most common microorganisms involved in urinary tract infection are: *Escherichia coli* (13%), *Klebsiella* (13%), *Enterococcus* (6%), *Proteus* (4%) and other microorganisms (4%)¹.

Currents study revealed that the majority 29(46.8%) patients had fever followed by 14(22.6%) had seizures due to fever, 12(19.4%) had diarrhea, 11(17.7%) had bad smell of urine, 10(16.1%) had vomiting associated with diarrhea and 10(16.1%) had respiratory symptoms. Salarzaei et al study observed the most common complaint in children's urine was bad smell of urine with 0.18. Specific symptoms such as urinary tract infection, dysuria, dribbling urination, frequent urination, restless urination and refuse to urinate were observed in a relatively small number of children (respectively 18%, 02%, 03%, 03% and 01%)¹. The review study conducted in 2015 by El-Sheikh et al. reported the prevalence of complaints of patients as: fever, suprapubic pain, abdominal pain, back pain, dysuria, urinary frequency and urinary incontinence¹³. Abdalla et al¹⁰ study observed that all children in the study group presented with generalized body swelling 105 (100%). Fever was a presenting symptom in 32 patients (30.5%), malaise in 28 patients (26.7%), oliguria in 25 patients (23.8%), while haematuria was

encountered in 20 patients (19.0%). Anorexia was the complaint in 13(12.4%) patients, cough in 12(11.4%) patients, abdominal pain in 7(6.7%) patients, while diarrhea, arthritis and convulsions were observed in 6(5.7%), 3(2.9%) and 1(1.0%) of the patients respectively.

Conclusion:

We conclude that children with nephrotic syndrome are frequently predisposed to UTI and in most cases it is asymptomatic, often undiagnosed. *E. coli* is the commonest organism causing UTI followed by *klebsiella*. It is necessary to examine the patient so as to discover and prevent the risk of potential complications specifically urinary tract infection by initiating appropriate therapy.

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