

Urinary Tract Infection in Children Presenting with Nephrotic Syndrome

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ABSTRACT

Background: Nephrotic syndrome, or nephrosis, is defined by the presence of nephrotic-range proteinuria, edema, hypoalbuminemia & hyperlipidemia. Nephrotic syndrome remains the common manifestation of glomerular disease in childhood. UTI is a common infection accompanying nephrotic syndrome. But there is no local evidence available.

Aim: To assess the frequency of urinary tract infection in children presenting with nephrotic syndrome in a tertiary care hospital.

Study design: Cross sectional study.

Methodology: Total 280 children fulfilled the inclusion criteria were included through non-probability convenience sampling. Urine sample was obtained in sterile container & was sent to the pathology laboratory of the hospital. Then reports were assessed & if pathogen was present, then UTI was labeled. Data was evaluated by using SPSS v.24. Quantitative data was presented as mean±SD. Qualitative data was presented as frequency and percentage. Chi-square test was applied with P-value ≤0.05 taken as significant.

Results: The mean age was 7.07±3.09 years. There were 152(54.3%) males and 128(45.7%) females. The mean weight of patients was 24.30±7.75 kg. The mean duration of nephrotic syndrome was 9.66±5.37 months. There were 147(52.5%) patients who had UTI while 133(47.5%) patients did not have UTI.

Practical Implication: As there is a high incidence of UTI among nephrotic children and there is lack of local data that specifically addresses this health issue thus current study was planned. Results regarding precise estimate of UTI frequency in nephrotic syndrome patients helped to formulate recommendations for early screening to initiate early management of UTI. This information also helped in reducing morbidity and mortality in children with nephrotic syndrome.

Conclusion: It was concluded that frequency of UTI was high in children with nephrotic syndrome hence screening of UTI is necessary on regular intervals in children with nephrotic syndrome.

Keywords: Urinary Tract Infection, Nephrotic Syndrome, Children, Proteinuria and Albuminuria.

INTRODUCTION

Nephrotic syndrome, or nephrosis, is defined by the presence of nephrotic-range proteinuria, edema, hypoalbuminemia & hyperlipidemia. In children it is defined as excretion of protein >40 mg/m²/h or a first-morning urine protein/creatinine of 2-3 mg/mg creatinine or greater¹. Nephrotic syndrome is the combination of nephrotic-range proteinuria with a low serum albumin level and edema².

It remains the common manifestation of glomerular disease in childhood as revealed by literature review. Minimal change nephropathy is the common underlying histopathological lesion. Relapses are frequent, increasing morbidity and treatment costs with the disease's initial fair prognosis and high response rate to corticosteroids³. Most important clinical determinant of outcome of this condition is steroid responsiveness⁴.

In the United States, Nephrotic syndrome is reported to affect 2–7 cases per 100,000 children under the age of 16 per year. According to a German study, the prevalence of nephrotic syndrome in people under the age of 18 was 1.2/100,000⁵. Infection is one of the complications & is a significant cause of morbidity in patients with NS.⁶ In NS patients, infection may start episodes or cause relapse while they are in remission⁷.

A common infection that occurs along with nephrotic syndrome is UTI. A high level of suspicion & early administration of the proper antibiotics will reduce morbidity & mortality⁸. One study showed that the frequency of UTI among nephrotic syndrome children was only 3% but another study reported that UTI was found in 40.26% among children with nephrotic syndrome^{9,10}. One more study has showed that study shown that the frequency of UTI among children with nephrotic syndrome was 66.7%¹¹.

As there is a high incidence of UTI among nephrotic children and there is lack of local data that specifically addresses this health issue thus current study was planned. Results regarding precise estimate of UTI frequency in nephrotic syndrome patients

helped to formulate recommendations for early screening to initiate early management of UTI. This information also helped in reducing morbidity and mortality in children with nephrotic syndrome.

The goal was to assess the frequency of urinary tract infection in children presenting with nephrotic syndrome in a tertiary care hospital.

METHODOLOGY

This cross sectional study was conducted at Pediatric Medicine, Services Hospital, Lahore Total 280 children fulfilled the inclusion criteria were included through non-probability convenience sampling. Sampling population was nephrotic patients. Demographic detailed (age, gender, weight, duration of symptoms) was noted. Urine sample was obtained in sterile container & was sent to the pathology laboratory of the hospital for assessment of presence or absence of pathogen in urine sample. Then reports were assessed and if pathogen was present, then UTI was labeled (as per operational definition). Patients with UTI were managed as per hospital protocol. Children of age 2-12 years, of either gender presenting with nephrotic syndrome, the presence of 3+ or more on dipstick urinalysis with edema, hypo-albuminuria of <2.5g/dL and hypercholesterolemia >200mg/d first time or with relapse were included. Children having history of recurrent UTI, with renal failure (GFR<60mL/min/1.73m²), sepsis and known structural or functional defects of urinary tract on medical record were excluded.

Statistical analysis: Data was evaluated by using SPSS v.24. Age, gestational age, weight and duration of nephrotic syndrome were presented by Mean & SD. Gender and UTI were presented by frequency & percentage. Data was stratified for age, gender, weight and duration of nephrotic syndrome. Post-stratification, chi-square test was calculated with p-value ≤ 0.05 taken as significant.

RESULTS

Total 280 patients were included. The mean age of patients was 7.07±3.09 years. There were 152(54.3%) males and 128(45.7%) females. The mean weight of patients was 24.30±7.75 kg. The

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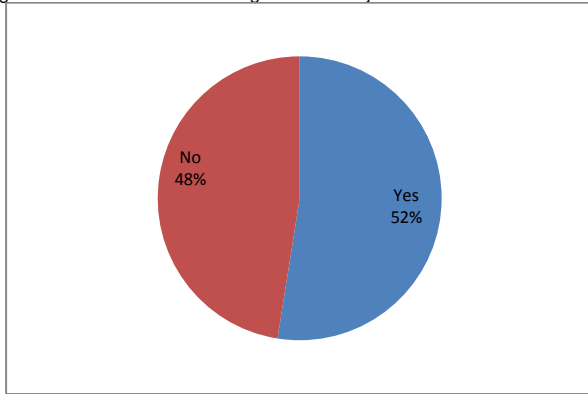
mean duration of nephrotic syndrome was 9.66±5.37 months as summarized in table-1.

Table-1: Demographic parameter of enrolled participants

Parameters	Categories	Frequency (%)
Gender	Male	152(54.29%)
	Female	128(45.71%)
Parameters		Mean ± SD
Age (years)		7.07±3.09
Weight (kg)		24.30±7.75
Duration of N. Syndrome		9.66±5.37

There were 147(52.5%) patients who had UTI while 133(47.5%) patients did not have UTI as summarized in figure-1.

Figure-1: Presence of UTI among enrolled subjects



Data was stratified by age. In patients aged 2-6years, UTI was present in 61 (48.8%) patients. In patients aged 7-12years, UTI was present in 86(55.5%) patients. In male patients, UTI was present in 79(52%) patients. In female patients, UTI was present in 68(53.1%) patients. In patients weighted 12-25kg, UTI was present in 80(51.3%) patients. In patients weighted 26-40kg, UTI was present in 67(54.0%) patients. Age & weight were insignificant difference with UTI (p >0.05) as shown by table-2. In patients having nephrotic syndrome from 1-6months, UTI was present in 50(56.8%) patients. In patients having nephrotic syndrome from 7-12months, UTI was present in 45(51.1%) patients. In patients having nephrotic syndrome from 13-18months, UTI was present in 52 (50.0%) patients. The difference was insignificant (p>0.05) as summarized by table-2.

Table-2: Comparison of UTI with age, gender, weight & duration of disease

		UTI		P-value
		Yes	No	
Age (years)	2-6	61(48.8%)	64(51.2%)	0.266
	7-12	86(55.5%)	69(44.5%)	
Gender	Male	79(52%)	73(48%)	0.848
	Female	68(53.1%)	60(46.9%)	
Weight (kg)	12-25	80(51.3%)	76(48.7%)	0.647
	26-40	67(54%)	57(46%)	
Duration of Disease	1-6	50(56.8%)	38(43.2%)	0.611
	7-12	45(51.1%)	43(48.9%)	
	13-18	52(50%)	52(50%)	

DISCUSSION

Urinary tract infection remains one of the common infection & a leading cause of morbidity in population.¹ Frequency of UTI depends on age & sex. Incidence of UTI is higher in girls than in boys, which may be caused by physiologic or anatomical reasons.² By the age of seven, 12 to 30% of girls & 8 to 2% of boys in the world are expected to have at least one episode of UTI, with recurrence occurring in 12 to 30% of those individuals within a year.³ Children with kidney disease, especially those who are

younger, may exhibit non-septic signs & symptoms unrelated to urinary tract.

In this study, there were 147(52.5%) patients who had UTI. According to one study, just 3% of children with nephrotic syndrome had UTIs.⁹ Another study revealed that UTI was the most common infection (25%) with 13(27%) significant infections occurring in the initial episode & 35(73%) in recurrence cases.¹² In our study, the frequency of UTI was 30.8%, that was comparable to earlier studies (15% and 37.18%) respectively and this was significantly greater than the 1.0-3.0% reported in the general pediatric population^{13,14}. Another study showed that the frequency of UTI among nephrotic syndrome children was 66.7%. The mean age for males was 8.1 years & females with 7.8 years. In 67.8% of those between the ages of two and fifteen, the most common cause of UTI was Staphylococcus aureus, Klebsiella1species (17.9%) & Pseudomonas1(14.2%)¹⁵. Similarly, another study found high prevalence of UTI in people with nephrotic syndrome.¹⁶ Hence, nephrotic syndrome patients should be examined for UTI, and appropriate treatment is advised.

Previous studies reported a prevalence of UTI as 38% and 33% which were comparable to the findings of the current study^{17,18}. Difference in incidence rates of UTI among nephrotic syndrome patients may be explained by differences in the forms of nephrotic syndrome found in our region compared to those seen in Caucasians. It's possible that patients with secondary syndrome, which is common in the tropics, have impaired immunity connected to nephrotic syndrome.

In this study, the mean age was 7.07±3.09 years.. In patients aged 2-6years, UTI was present in 61 (48.8%) patients. In patients aged 7-12years, UTI was present in 86 (55.5%) patients. In male patients, UTI was present in 79 (52%) patients. In female patients, UTI was present in 68(53.1%) patients. The difference was insignificant (p>0.05).

In a study conducted in Iran, the age of the outbreak, gender, relapses number, infection & damage were assessed in medical records of all the children aged 1.0 to 10.0 with clinical diagnosis of nephrotic syndrome1who had at least 7.0 years of routine clinic visits. Their study showed that urinary tract infections in women were common in the age range of 5 to 10 years.⁸ However, others found that both male & female experienced UTI attacks¹⁹.

This reflected the effect of racial factors in gender1distribution of the1disease. The frequency of recurrent1urinary tract infections was considerably lower in the age range of 6 month to 8 years compared to the group of 8 to 14 years (P=0.001). This may be a sign that structural kidney and bladder abnormalities in patients older than 8.0 years are stable & likely to result in recurrent urinary tract infections⁸.

The frequency of urinary tract1infection in young children is particularly crucial since UTI in this age1group may not cause medical signs other than fever, & if it's not identified, it may1result in patients suffering from kidney damage (scars) without receiving treatment. Additionally, children & parents may not readily accept catheterization or supra-pubic aspiration into the urethra to get urine samples from this age group because it is more difficult to prepare urine samples for them than it is for older patients²⁰.

Limitations of study: Financial constrains and limited resources with no genetic workup and long follow-ups added to limitations. It was a single centre study.

CONCLUSION

It was concluded that frequency of UTI was high in children with nephrotic syndrome hence screening of UTI is necessary on regular intervals in children with1nephrotic syndrome.

Author's contribution: SAK, NE & MWS: Overall supervision and Write up and literature review, **MA, MA & SA:** Literature review help in write-up.

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