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Research Article

A Prospective Study of Urinary Tract Infection in Children with Nephrotic Syndrome in a Tertiary Care Hospital

Dr.M.Bhuvaneswari[1*], Dr.G.B.Meghana[2]
[1*]Associate Professor, Department of Paediatrics, Surabhi Institute of Medical Sciences, Siddipeta, Telangana.
[2]Associate Professor, Department of DVL, JMN Medical College, Panchpota, Chakdaha, West Bengal.
Corresponding Author: Dr.M.Bhuvaneswari
Associate Professor of Paediatrics, Surabhi Institute of Medical Sciences, Siddipeta, Telangana.
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Abstract
Introduction: Nephrotic Syndrome (NS) is among the most common chronic kidney diseases occurring in childhood. The incidence of idiopathic NS in Asian population is reported at 2-3 cases per 1,00,000 children. Defense mechanisms are impaired in patients with NS due to its consequences of tissue edema, urinary loss of immunoglobulin, complement and secondary effects to its treatment including steroids and other immunosuppressants. Immuno-compromised status of NS can result in increased susceptibility to various infections, which could be potentially serious and life-threatening without prompt diagnosis and treatment.
Material and Methods: A prospective and descriptive study of all the patients with a diagnosis of nephrotic syndrome who attended to the Pediatric Outpatient Department (OPD) or were admitted at Department of Paediatrics, Surabhi Institute of Medical Sciences, Siddipeta, Telangana over a study period of one year from January 2024 to December 2024. 60 patients who have full filled the criteria of nephrotic syndrome (According to ISKDC) were included in the present study. The objective of the study were explained and written consent was obtained from the parents, prior to inclusion in the study. A detailed clinical examination was performed and findings were noted in the data sheet. Clean catch midstream urine samples were obtained from all the patients. Urine examination including routine analysis, microscopy, culture and sensitivity was done as per hospital standard policies.
Results: The study was conducted over a period of 12 months and consisted of 60 children (40 males and 20 females). During this period, out of 60 children in the study nine had culture positive UTI (12 males and 6 females). The most common organism isolated from the urine culture was Escherichia coli followed by proteus, enterococcus, pseudomonas and Klebsiella, which was statistically significant (Binomial test p=0.043). Of the 18 cases who had culture positive UTI, 6 were newly diagnosed NS and 12 were relapse NS. There was no significant difference between the two groups with regard to sex and age distribution.
Conclusion: We conclude that urinary tract infections are an important, but often under diagnosed infection in children with nephrotic syndrome. All children with nephrotic syndrome newly diagnosed or relapse should be screened for the presence of UTI.

Keywords: Nephrotic Syndrome, Immunosuppressants, Escherichia Coli, Enterococcus, Pseudomonas and Klebsiella.

INTRODUCTION

Nephrotic Syndrome (NS) is among the most common chronic kidney diseases occurring in childhood. The incidence of idiopathic NS in Asian population is reported at 2-3 cases per 1,00,000 children. Defense mechanisms are impaired in patients with NS due to its consequences of tissue edema, urinary loss of immunoglobulin, complement and secondary effects to its treatment including steroids and other immunosuppressants. Immuno-compromised status of NS can result in increased susceptibility to various infections, which could be potentially serious and life-threatening without prompt diagnosis and treatment.[1]

Urinary Tract Infection (UTI) is a common bacterial infection in infants and children. The risk of having a UTI before the age of 14 years is approximately 1-3% in boys and 3-10% in girls. The prevalence of UTI varies from 4% in neonatal period to 0.4% in the school and pre-school age children. The diagnosis of UTI is

often missed in infants and young children, as urinary symptoms are minimal and often non-specific.[2]

The occurrence of Urinary Tract Infection (UTI) is about 30%, in children with nephrotic syndrome, however it often goes undiagnosed. Other infections which occur in children with NS include spontaneous bacterial peritonitis, bacteraemia, sepsis, cellulitis and pneumonia. Relapses in nephrotic syndrome are often temporally associated with increased occurrence of infection.[3]
Although there have been several studies in the past pertaining to infections in nephrotic syndrome, most have been from the developed countries and in hospitalized patients. As majority of these children are managed on an outpatient basis, these studies might not reflect the true spectrum of illness in our setting.[4,5]

There is a paucity of population based studies in literature addressing the trends and potential factors associated with the infections in children with NS. The present study was conducted to investigate the trends of the occurrence and etiology of urinary tract infections in children with nephrotic syndrome mainly outpatients in our hospital a tertiary care unit.

MATERIALS AND METHODS

Source of Data and Study design

A prospective and descriptive study of all the patients with a diagnosis of nephrotic syndrome who attended to the Pediatric Outpatient Department (OPD) or were admitted at Department of Paediatrics, Surabhi Institute of Medical Sciences, Siddipeta, Telangana over a study period of one year from January 2024 to December 2024.

Method of Collection of Data

60 patients who have full filled the criteria of nephrotic syndrome (According to ISKDC) were included in the present study. The objective of the study were explained and written consent was obtained from the parents, prior to inclusion in the study.
A detailed clinical examination was performed and findings were noted in the data sheet. Clean catch midstream urine samples were obtained from all the patients. Urine examination including routine analysis, microscopy, culture and sensitivity was done as per hospital standard policies.

Sample Size

A sample size of 60 children with nephrotic syndrome admitted in the pediatric ward or attended the pediatric OPD during the study period.

Inclusion Criteria

All patients below the age group of 15 yrs. who attended paediatric OPD/IPD and were diagnosed as nephrotic syndrome (New cases or relapse) according to ISKDC with or without the symptoms suggestive of UTI.

Diagnosis of Nephrotic Syndrome

ISKDC (International Study of Kidney Diseases in Children) Criteria for nephrotic syndrome were eligible for inclusion:

1. Edema.
2. Proteinuria: Urine protein >3+ or ≥40 mg/m2 per hour by sulfosalicylic acid test.
3. Protein creatinine ratio >2.
4. Hypoalbuminemia (Serum albumin ≤2.5 g/dl).

Relapse of Nephrotic Syndrome

Reappearance of proteinuria ≥40mg/m2 per hour or >3+ by sulfosalicylic acid test for three consecutive days with or without oedema in a child who had attained remission previously.

Exclusion Criteria

1. Nephrotic syndrome patients already diagnosed with UTI and on antibiotics.
2. Relapse patients who are already included in the study.

Method of Study

A total of 60 children of paediatric age group (Up to 15 yrs.) were included.

Collection of Urine Specimen

The specimen for urine culture was obtained carefully to prevent contamination. A clean-catch midstream urine specimen was directly collected in a sterile container. Antiseptic washes and forced prepucial retraction were not advised.

Definition of Urinary Tract Infection

A bacterial colony count of >105/ml of a single species in a midstream clean catch sample of urine.

Statistical Methods Used

The collected statistical data were presented as frequency, percentage, analyzed using Fisher exact and binomial tests. 'P'value <0.05 was considered significant.

RESULTS

The study was conducted over a period of 12 months and consisted of 60 children (40 males and 20 females). During this period, out of 60 children in the study nine had culture positive UTI (12 males and 6 females). The most common organism isolated from the urine culture was Escherichia coli followed by proteus, enterococcus, pseudomonas and Klebsiella, which was statistically significant (Binomial test p=0.043). Of the 18 cases who had culture positive UTI, 6 were newly diagnosed NS and 12 were relapse NS. There was no significant difference between the two groups with regard to sex and age distribution. (Table 2 and 3)

Table 1: Occurrence of UTI in Nephrotic Syndrome Binomial test p= 0.043

Urinary Tract Infection	Number of patients	Percentage
Positive	18	30%
Negative	42	70%
Total	60	100%

Table 2: Gender distribution in UTI Fisher's exact test p= 0.656

Gender	UTI-Present	UTI-Absent
Male	12	28
Female	6	14
Total	60	100%

Table 3: Age distribution in UTI Fishers exact test p= 0.961

Age	Present	Absent
<3 years	4	8
3-8 years	12	28
8-15 years	2	6
Total	18	42

DISCUSSION

The child with nephrotic syndrome represents an immune compromised host and hence is susceptible to a variety of infections. This could be due to decreased serum immunoglobulin, protein deficiency, decreased bactericidal activity of the leukocytes, immunosuppressive therapy, decreased perfusion of the spleen caused by hypovolemia and loss in the urine of a complement factor (Properdin factor 3) that opsonizes certain bacteria.[6]

The pressure on the collecting system by edematous pyramids causes narrowing and functional obstruction to the flow of urine, further predisposing them to UTI. Of all the infections in children, Urinary Tract Infections (UTI) are significant due to their association with vesicoureteric reflux and propensity for long term damage.[7]

Information regarding their prevalence in nephrotic children is scant and conflicting, although advances in knowledge and use of medications have improved outcomes of NS and reduced comorbidity and mortality of NS in recent years.[8]

The occurrence of UTI in nephrotic children in our study was 30%, which is comparable to the study done by Chang-Ching et al., where incidence of UTI in nephrotic syndrome was also 30%. The commonest infection was pneumonia (49%) second being UTI (30%), bacteraemia/sepsis (11%), peritonitis (11%) and cellulitis (5%).[9]

In a similar study done by S. Gulati et al. titled urinary tract infection in nephrotic syndrome reported that urinary tract infections are very common (13%), but often goes undiagnosed.[10]

CONCLUSION

We conclude that urinary tract infections are an important, but often under diagnosed infection in children with nephrotic syndrome. All children with nephrotic syndrome newly

diagnosed or relapse should be screened for the presence of UTI.

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