

## ORIGINAL ARTICLE

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# URINARY TRACT INFECTION IN CHILDREN WITH NEPHROTIC SYNDROME IN KANO, NIGERIA

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### Abstract

**Background:** Nephrotic syndrome is a common childhood renal disorder; the prevalence of Urinary tract infection (UTI) in these patients is high. The increased prevalence of UTI are due to immunoglobulin loss, defective T cell function, presence of ascites and relative malnutrition.

**Objective:** The study is to evaluate the prevalence of UTI, its etiological agents, antibiotics, sensitivity pattern and the outcome in children with nephrotic syndrome.

**Methods:** A prospective study of all patients with diagnosis of nephrotic syndrome from January 2003 to December 2006. Urine specimen were routinely obtained by clean catch method following careful preparation urethral orifices. The specimens were processed immediately. Five millimeters (5mm) loopful of the sample were inoculated on a blood agar and CLED agar plates. Identification of the organism to species level was by using stokes disc diffusion technique.

**Results:** Forty two patients were studied. The mean age and SEM for males was  $8.2 \pm 0.5$  years and females with  $7.9 \pm 0.8$  years. The age range was two to fifteen years. UTI was caused predominantly by *Staphylococcus aureus* in 67.9%, *Klebsiella* species (17.9%) and *Pseudomonas* (14.2%). There was high invitro resistance of these organisms to nalidixic acid and ampicillin but sensitive to cefotaxime, ceftriazone and ciprofloxacin.

**Conclusion:** It is recommended that UTI should be sought for in patients with nephrotic syndrome and treatment should be prompt and appropriate.

**Key words:** Childhood, nephrotic syndrome, UTI, prevalence

### Résumé

**Arrière-plan :** Syndrome néphrotique est un trouble rénale enfance courant ; la prévalence des voies urinaires infections (UTI) chez ces patients est élevée. La prévalence accrue de UTI sont dues à perte immunoglobuline, fonction de la cellule T défectueux, présence de l'ascite et la malnutrition relative.

**Objectif:** L'étude est d'évaluer la prévalence de la UTI, ses agents étiologique, les antibiotiques, motif de la sensibilité et le résultat chez les enfants avec néphrotique Syndrome.

**Méthodes:** Une étude éventuelle de tous les patients présentant le diagnostic du syndrome néphrotique entre le janvier 2003 à décembre 2006. Le spécimen d'urine ont été par habitude obtenus par la méthode propre de crochet suivant les orifices uréthraux de préparation soigneuse. Les spécimens ont été traités immédiatement. Cinq millimètres (5mm) de loopful de l'échantillon ont été inoculés des plats de sang agar et d'agar de CLED. L'identification de l'organisation aux espèces de niveau était en employant charge la technique de diffusion de disque

**Résultats:** Quarante deux patients ont été étudiés. L'âge moyen et le SEM pour des mâles étaient  $8.2 \pm 0.5$  years et femelles avec  $7.9 \pm 0.8$  years. La tranche d'âge était de deux à quinze ans où UTI a été causé principalement près *Staphylocoque* doré dans 67.9%, espèces de *klebsiella* (17.9%) et *pseudomonas* (14.2%). Il y avait hauts résistance d'invitro de ces organisations à l'acide et à l'ampicilline nalidixic mais sensible au cefotaxime, au ceftriazone et au ciprofloxacin.

**Conclusion:** Il est recommandent qu'UTI devrait être cherché pour dans des patients présentant le syndrome nephrotique et le traitement devrait être prompt et approprié.

**Mots clés:** Enfance, syndrome nephrotique, UTI, prédominance

Urinary tract infection (UTI) is a leading cause of childhood morbidity and mortality, is one of the commonest renal diseases in childhood.<sup>1-4</sup> The prevalence of UTI varies from 4% in neonatal period to 0.4% in the school and pre-school age children.<sup>5</sup> Nephrotic syndrome is another common childhood renal disorder among these group of patients, the prevalence of UTI is high.<sup>6,7</sup> McVicar et al<sup>7</sup> reported a prevalence of 21% while Gulati et al<sup>6</sup> also reported a prevalence rate of 13.7%. The increased prevalence of UTI in patients with Nephrotic syndrome are due to immunoglobulin loss in urine,<sup>8</sup> defective T cell function, presence ascites and relative malnutrition.<sup>9</sup> UTI has also been reported to adversely influence the response of patients with nephrotic syndrome to corticosteroids.<sup>10</sup> However McVicar et al<sup>7</sup> did not find any relationship between UTI and response to steroid therapy. UTI has also been shown to have no role in the incidence of relapses in nephrotic syndrome.<sup>7</sup>

There are important differences in the epidemiology and histopathology of nephritic syndrome between Caucasians and Africans.<sup>11</sup> There is a high incidence of secondary nephrotic syndrome in Africans caused mainly by quartan malaria nephropathy.<sup>12,13</sup> There has been few studies on the prevalence of UTI among patients with secondary nephrotic syndrome. The present study is to evaluate the prevalence of UTI, its etiological agents, invitro antibiotics sensitivity pattern of the organisms and outcome in patients with nephrotic syndrome.

## Patients and Methods

A prospective study of all the patients with a diagnosis of nephrotic syndrome admitted to the Paediatric Ward of Aminu Kano Teaching Hospital, Kano, from January 2003 to December, 2006. Age, Sex, results of urine culture, invitro antibiotic sensitivity pattern of isolated organisms were studied. Urine specimens from children with nephrotic syndrome were routinely obtained by clean catch method following careful preparation of

the urethral orifices and were collected into sterile containers and promptly transported to the laboratory. The specimens were processed immediately. Five millimeters (5mm) loopful of the sample were inoculated on a blood agar and CLED agar plates. The blood agar plate was incubated aerobically for 18 – 24 hours at 37°C. Samples showing at least 10<sup>5</sup> bacterial colonies per milliliters of urine were considered to indicate significant bacteriuria. Identification of the organisms to species level was by standard biochemical methods and antimicrobial sensitivity test were carried out using stokes disc diffusion technique.<sup>14</sup>

The chi squared test with Yates correction and student's *t* test were used for statistical analysis.

## Results

Forty-two patients were studied. There were 24(57.1%) males and 18(42.9%) females, (a male to female ratio of 1.3:1). The mean age and SEM for males was 8.2 ± 0.5 years compared with 7.9 ± 0.8 years for females. The age range was two to fifteen years. The age and sex distribution of patients is as shown in Table 1. Twenty – eight (66.7%) had urinary tract infection. There were 16(38.1%) males and 12(28.6%) females.

*Staphylococcus aureus* was isolated in 19(67.9%) patients, *Klebsiella* species in 5(17.9% patients) and *Pseudomonas* species in 4(14.2%) patients.

The invitro sensitivity patterns of isolated organisms to various antibiotics is as shown in Table 2. All the *Staphylococcus aureus* organisms and the coliform organism were 100 percent sensitive to ciprofloxacin, cefotaxime and ceftriazone. However, invitro sensitivity of the same organism to commonly used antibiotics including trimethoprim sulphamethoxazole ampicillin, and nitrofurantoin was 35 percent or less. Gentamycin and streptomycin offered 100% coverage for the *Klebsiella* and *Pseudomonas* species.

**Table 1.** Age and sex distribution of 42 patients with Nephrotic syndrome

Age (years)	Sex		Total	%
	Males	Females		
1 – 3	4	3	7	16.7
4 – 6	10	6	16	38.1
7 – 9	5	4	9	21.4
10 – 12	4	5	9	21.4
13 – 15	1	-	1	2.4
Total	25 (57.1)	18(42.5)	42	100

**Table 2.** Sensitivity pattern of pathogens isolated from urinary tract of Nephrotics % sensitivity

Isolates	Ampicillin	Gentacin	Cotrimazole	Nitrofurantoin	Ceftriazone	Cefotaxime	Ciprofloxine	Streptomycin	Cloxacillin
<i>Staphylococcus aureus</i>	35	48	21	32	100	100	100	42	82
<i>Klebsiella</i>	41	100	12	16	66	64	92	100	42
<i>Pseudomonas</i>	18	100	5	-	25	30	64	100	60

## Discussion

The present study shows that 66.7% of 42 patients with nephrotic syndrome had urinary tract infection, this observation of high prevalence of UTI among nephrotic syndrome patients have been reported by other workers.<sup>6, 7, 15</sup> Ibadin<sup>15</sup> reported a prevalence of 44.8% and this is similar to the present study. However, Gulati et al<sup>6</sup> reported 13.8% and McVicar<sup>7</sup> reported a prevalence of 21%. The differences in the types of nephrotic syndrome seen in our region as compared to those seen in Caucasians may account for the varying prevalence rates of UTI in patients with nephrotic syndrome.<sup>11</sup> It is possible that impaired immunity associated with nephrotic syndrome is more marked in patients with secondary syndrome which is very common in the tropics.<sup>16</sup> About 45% of our patients were aged seven years and above which makes it unlikely to be primary nephrotic syndrome.<sup>11</sup>

In general population, post-neonatal UTI is relatively rare in males, sex did not influence the development of UTI.<sup>10</sup> The immune compromise associated with nephrotic syndrome is not sex discriminatory, this may be the reason to explain the high prevalence of UTI in males in our series this is also similar to the study by Ibadin<sup>15</sup> in (Southern Nigeria).

*Staphylococcus aureus* was the commonest organism comprising 67.9% of isolates, followed by *Klebsiella* (17.9%) and *Pseudomonas* (14.2%). This finding is similar to the study by Ibadin<sup>15</sup> who reported 54.3% of isolates were that of *Staphylococcus aureus*. However, Tsai et al<sup>17</sup> who reported Gram-negative bacilli as the predominant cause of infections, including UTI, in patients with nephrotic syndrome. The sensitivities of *Staphylococcus aureus* organism to ceftriaxone and ciprofloxacin were 100%; their sensitivities to commonly used antibiotics such as nalidixic acid and ampicillin were low. Gentamycin and streptomycin had 100%, coverage for the gram-negative organisms, but much lower rates to *Staphylococcus aureus*. There is an increasing trend of resistance by common bacteria to routine antibiotics, this had been noted in the region.<sup>18, 19</sup> The common practice

of self medication, use of fake and substandard drugs and drug abuse could explain this unfortunate trend.

The high prevalence of UTI obtained in the present study and the long term complications warrant its aggressive treatment.<sup>20</sup> It is therefore advocated that routine urine cultures should be carried out on patients with nephrotic syndrome and appropriate antibiotics should also be used.

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