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A PROSPECTIVE STUDY OF URINARY TRACT INFECTION IN CHILDREN WITH NEPHROTIC SYNDROME IN A TERTIARY CARE HOSPITAL

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Abstract

Introduction: Nephrotic syndrome characterized by the presence of heavy proteinuria, hypoalbuminemia, edema and hyperlipidemia, is a common renal disorder in pediatric population. In developed countries, its incidence is 20 to 40 and 20 to 70 per million populations in UK and USA respectively, whereas in Asian countries it is 90 to 160 per million populations.

Materials and methods: This is an institution based (single centre) cross-sectional prospective observational study conducted in Department of Pediatrics, Singareni Institute of Medical Sciences, Ramagundam during the period of January 2024 to December 2024. During the present study period, a total of 206 patients (129 male and 76 female) with nephrotic syndrome, who attended/admitted the out-patient/in-patient department of Pediatric Medicine were enrolled. All newly diagnosed and relapse cases of nephrotic syndrome based on inclusion exclusion criteria was included in this study. Respondent was either of the parents or caregiver of the study subjects.

Results: A total of 41 patients were finally enlisted and evaluated. Thorough history taking, clinical examination and laboratory investigations were done as per case record form with special emphasis on detection of UTI in enlisted nephrotic patients. Then data were compiled and analysed. The following observations were made as given below. Baseline characteristics was depicted in (Table 1).

Conclusion: The results of this study showed that the most common microorganisms involved in urinary tract infection were: E. coli 33.3% (n=4) followed by Klebsiella 25%(n=3), Proteus 16.7%(n=2), Staphylococcus aureus 12.5%(n=2), Citrobacter, Acinetobacter and mixed growth were found in 4.2%(n=1) each. It was found that Amikacin (81%), Ofloxacin (80%), Cefixime (90%), Meropenem (79.2%), Nitrofurantoin (72.2%), Piperacillin + Tazobactum (95.2%) were very much effective against most of the culture isolates. Whereas Staphylococcus

aureus was found to be susceptible to Amoxyclav (100%), Meropenem (66.7%) and Linezolid (66.7%). Minor isolates were also found to be susceptible to most of the antibiotics.

Key Words: Nephrotic syndrome, edema, hyperlipidemia, urinary tract infection.

INTRODUCTION

Nephrotic syndrome characterized by the presence of heavy proteinuria, hypoalbuminemia, edema and hyperlipidemia, is a common renal disorder in pediatric population. In developed countries, its incidence is 20 to 40 and 20 to 70 per million populations in UK and USA respectively, whereas in Asian countries it is 90 to 160 per million populations.[1]

These patients have an increased risk of developing bacterial infections due to defective cell mediated immunity, immunosuppressive therapy, malnutrition and urinary losses of immunoglobulins, properdin factor B and complement factors.[2] Among all infections UTI remains the most important because it may be asymptomatic and thus may be missed if active search is not made. [3]

UTI if left untreated in a patient of nephrotic syndrome who has been started on steroid therapy will complicate the course of both the UTI and nephrotic syndrome.[4] Assessment of magnitude of problem would add to the existing figures of UTI prevalence which varies from study to study. Delineation of bacterial spectrum in UTI will help in selecting the empirical antibiotic therapy till the results of culture are awaited. [5]

The primary objective was to find out the prevalence of UTI in nephrotic syndrome. Uncovering the bacterial spectrum and their susceptibility pattern were secondary objectives.

MATERIALS AND METHODS

This is an institution based (single centre) cross-sectional prospective observational study conducted in department of Pediatrics, Singareni Institute of Medical Sciences during the period of January 2024 to December 2024.

During the present study period, a total of 206 patients (129 male and 76 female) with nephrotic syndrome, who attended/admitted the out-patient/in-patient department of Pediatric Medicine were enrolled. All newly diagnosed and relapse cases of nephrotic syndrome based on inclusion exclusion criteria was included in this study. Respondent was either of the parents or caregiver of the study subjects.

Inclusion criteria: All patients with the age group between 2-12 years, attending Pediatric out-patient department or admitted in Pediatrics Department with the diagnosis of Nephrotic Syndrome were included in this study. Written informed consent for participation in the study was obtained.

Exclusion criteria

- Children with gross urogenital anomalies.
- Nephrotic syndrome with atypical presentation-hypertension, gross hematuria.
- Nephrotic syndrome with features of complications other than UTI.
- H/O of taking antibiotic during last 15 days prior to Admission.
- Where patient's care giver was unwilling to give consent.

The gathered data was entered in SPSS-23 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

A total of 41 patients were finally enlisted and evaluated. Thorough history taking, clinical examination and laboratory investigations were done as per case record form with special emphasis on detection of UTI in enlisted nephrotic patients. Then data were compiled and analysed. The following observations were made as given below. Baseline characteristics was depicted in (Table 1).

Gender	Age group		Total No. (%)	P Value
	2-7(years) No. (%)	7-12(years) No. (%)		
Male	19	5	24 (59.8)	0.94
Female	13	4	17 (40.2)	
Total	32 (76.8)	9(23.2)	41 (100)	

Table 1: Distribution of participants by age group and gender (n=41)

Analysis revealed that majority of patients 32 (76.83%) belonged to age group 2-7 years. The overall average age was estimated as 5.59±1.89 (mean±SD) years. Median age was 5.05 years with a range of 8.4 years. Out of 24 male patients 19(77.6%) belonged to age group 2-7 years and 5(22.4%) belonged to 7-12 years. Out of 17 female patients 13(75.8%) belonged to 2-7 years and 4 (24.2%) belonged to 7-12 years. Among 41 participants, there was a male predominance 59.76% (n=24). Male: Female=1.49:1. distribution of participants by their UTI status (n=41) and distribution of participants with UTI by symptoms (n=12) Among 41 participants with nephrotic syndrome 29.3% (n=12) participants had UTI. Among participants with UTI majority 19% (n=8) were asymptomatic and 10% (n=4) were symptomatic.

Organism / **Antibiotic**	**E.Coli**	***Klebsiella***	***Proteus***	***Staphylococcus***	***Citrobacter***	***Acinetobacter***	**Mixed growth**	**Total**
Ceftriaxone	3/8 (37.5%)	3/6 (50%)	2/4 (50%)	-	1/1 (100%)	-	1/1 (100%)	10/20 (50%)
Amikacin	7/8 (87.5%)	5/6 (83.3%)	2/4 (50%)	-	1/1 (100%)	1/1 (100%)	1/1 (100%)	17/21 (81%)
Amoxyclav	-	-	-	3/3 (100%)	-	-	-	3/3 (100%)
Ofloxacin	6/8 (75%)	5/6 (83.3%)	3/4 (75%)	-	1/1 (100%)	-	1/1 (100%)	16/20 (80%)
Cefixime	7/8 (87.5%)	6/6 (100%)	3/4 (75%)	-	1/1 (100%)	-	1/1 (100%)	
Meropenem	7/8 (87.5%)	4/6 (66.7%)	3/4 (75%)	2/3 (66.7%)	1/1 (100%)	1/1 (100%)	1/1 (100%)	
Nitrofurantoin	8/8 (100%)	3/6 (50%)	2/4 (50%)	-	-	-	-	13/18 (72.2%)
Linezolid	-	-	-	2/3 (66.7%)	-	-	-	2/3 (66.7%)
Pip + taz	7/8 (87.5%)	6/6 (100%)	4/4 (100%)	-	1/1 (100%)	1/1 (100%)	1/1 (100%)	20/21 (95.2%)

Table 2: Urine culture sensitivity pattern

Baseline parameters	**Nephrotic syndrome with UTI (group A) (Mean±SD)**	**Nephrotic syndrome without UTI (group B) (Mean±SD)**	**P value**
Hb	10.23±0.75	10.43±0.75	0.28
ESR	44.80±10.15	40.33±10.45	0.08
TLC	11538.33±1282.19	11074.83±1575.59	0.11
Protein	4.26±0.27	4.24±0.29	0.87
Albumin	2.36±0.16	2.41±.20	0.30
Cholesterol	422.13±34.65	307.43±26.13	0.0001
Urea	17.13±2.25	16.75±2.30	0.49
Creatinine	0.69±0.09	0.68±0.08	0.58

Table 3: Baseline parameters among two groups

DISCUSSION

The nephrotic syndrome is an immune compromised state. Patients of nephrotic syndrome have an increased risk of developing bacterial infections due to defective cell mediated immunity, immunosuppressive therapy, malnutrition, and urinary losses of immunoglobulins, properdin factor B and complement factors. Among all infections urinary tract infection is of special interest because most of the urinary tract infections in nephrotic syndrome are asymptomatic. The pressure exerted by edematous pyramids on the collecting system causes narrowing and functional obstruction to the flow of urine, further predisposing them to UTI. [6]

In current study, majority patients 32 (76.83%) belonged to age group 2-7 years. The overall average age was estimated as 5.59±1.89 (mean±SD) years. Median age was 5.05 years with a range of 8.4 years. In this study regarding clinical profile of the patient it was observed that participants with UTI majority 8(66.7%) were asymptomatic and 4 (33.3%) were symptomatic.[7]

In present study microscopic examination of urine showed pyuria in 8 (62.5%) in nephrotic syndrome with UTI patients and in 16(56.9%) in nephrotic syndrome without UTI (p value >0.05, not significant). Microscopic hematuria was found in 8 (33.3%) of UTI patients and in 9 (15.5%) of without UTI patients that was not statistically significant (p value >0.05). In the present study attacks of the nephrotic syndrome (first episode or relapse) was not found to be significant between the UTI groups and non UTI groups.[8,9]

In present study the age, gender, ethnicity, religion, serum albumin, total protein, haemoglobin, erythrocyte sedimentation rate, serum creatinine, serum urea were not statistically significant between the UTI groups and non UTI groups. Mean serum cholesterol of nephrotic syndrome with UTI group was 422.13±34.65 (Mean±SD) and nephrotic syndrome without UTI group was 307.43±26.13 (Mean±SD).The variation amongst the two groups were found to be significant (p=0.0001). In the present study conducted over 41 nephrotic syndrome patients, UTI was found in 12(29.30%) of cases.[10]

CONCLUSION

The results of this study showed that the most common microorganisms involved in urinary tract infection were: E. coli 33.3% (n=4) followed by Klebsiella 25%(n=3), Proteus 16.7%(n=2), Staphylococcus aureus 12.5%(n=2), Citrobacter, Acinetobacter and mixed growth were found in 4.2%(n=1) each. It was found that Amikacin (81%), Ofloxacin (80%), Cefixime (90%), Meropenem (79.2%), Nitrofurantoin (72.2%), Piperacillin + Tazobactum (95.2%) were very much effective against most of the culture isolates. Whereas Staphylococcus aureus was found to be susceptible to Amoxyclav (100%), Meropenem (66.7%) and Linezolid (66.7%). Minor isolates were also found to be susceptible to most of the antibiotics.

The children with nephrotic syndrome are frequently predisposed to UTI and in most cases it is asymptomatic, often undiagnosed. Higher serum cholesterol level may predispose the nephrotic child for UTI.

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