

Original Article

MICROBIAL FLORA ANALYSIS OF URINARY TRACT INFECTION IN PATIENTS SUFFERING FROM NEPHROTIC SYNDROME IN LAHORE, PAKISTAN

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Objective: To find the microbial flora in urinary tract infection patients suffering from nephritic syndrome in tertiary care hospital, Lahore.

Methods: This cross sectional study was conducted in a tertiary care hospital Lahore from June 2014 - June 2016. A total of 500 samples were collected from nephrotic syndrome patients suffered from UTI. The patients were divided in found age groups group 1 (15-25 years), group 2 (25-40 years), group 3 (40-60 years) and group 4 (above 60). Data was collected by using a predesigned questionnaire. Midstream urine was collected in sterile container and processed by standard microbiological methods. Frequency was determined by calculating the percentages.

Results: Out of 500 samples, females were found to be more affected i.e. 61 % (n=305) as compared to males, 39 % (n=195). Both genders were found to be most affected in age group 25-40 years (109 females: 92 males) and least was found in patients between 40-60 years in females while above 60 years in male patients. *E. coli* showed the highest frequency (71 %) and found in all age groups, followed by *Klebsiella* (10%), *S. aureus* (10 %), *Enterococcus* (3 %), *Streptococcus* (3 %) and *P. aeruginosa* (3 %). Gram positive bacteria showed sensitivity to vancomycin, linezolid, ampicillin, nitrofurantoin, cephadrin and penicillin. Gram negative bacteria showed sensitivity to imipenem, meropenem, gentamicin, amikacin, sulfzone, tazocin, ceftazidime, polymyxin B, colistin and nitrofurantoin.

Conclusions: Precautionary measures should be strictly followed to avoid infections and complications in urinary system by proper cleanliness and awareness of sex education in adults.

Keywords: nephrotic syndrome, urinary tract infection, bacteria, antibiotic sensitivity pattern.

Introduction

Nephrotic syndrome (NS) is a common renal disorder¹⁻⁶ characterized by hypercholesterolemia, hyperlipidaemia,⁷ hypoalbuminaemia, proteinuria and generalized oedema.^{8,9} The compromised immune system, including defective T-cell function and immunoglobulin loss, is responsible for bacterial invasion and colonization^{8,10} which lead to UTI by hospital or community acquired microbial flora.^{11,12} UTI is generally classified as lower and upper UTI. In lower UTI, bladder is infected (cystitis) whereas in upper UTI, one or both kidneys are infected (pyelonephritis).^{11,12} As urine is formed in the body, it is immediately thrown out from bladder to urethra. Sometimes, urine remains in bladder and hence the microorganisms gain entry into bladder via urethra followed by colonization of urethral walls or bladder walls. Normally urine is sterile. But if somehow, bacteria gained entry into the urethra (its infection is called urethritis) and colonize it by overcoming host defense mechanisms, it results in UTI.¹² UTIs are common all over the world. It can be hospital

acquired or community acquired.^{11,13} The agents responsible for UTI include *Staphylococcus*, *Enterococcus*, and *Klebsiella*.¹² The causes of UTI in both genders include indwelling catheters, renal transplantation, renal failure, pregnancy, etc.¹⁴ The women are more likely to be infected by UTI as compared to men¹³ because of anatomy of female urinary and reproductive system.^{12,15} The objectives of this study were microbial analysis of NS patients suffering from UTI. Both genders and all age patients were included in the study. The ratio of males, females and microorganism responsible for causing UTI in them, was determined. Antibiotic sensitivity pattern of bacterial isolates was established.

Methods

For this study, 500 samples were collected in sterile containers from a tertiary care hospital, Lahore. The study was carried from June 2014 - June 2016. The inclusion and exclusion criteria were kept in mind at time of samples collection. Patients of all age and both genders were considered who were suffered from both genders were considered who were

suffered from both UTI and renal failure (NS). Patients who were suffered from UTI but not renal failure (NS) were excluded from this study. Before sampling, the female patients were advised to clean the area around urethral opening with clean tap water and dry it. The urine samples from females were collected with labia apart in order to reduce the chances of commensal flora contamination. For male patients, it was advised to wash the hands before collecting the urine (middle of the urine flow) in sterile container. For isolation and identification of microorganisms from urine samples CLED agar and mannitol salt agar media were used. All bacterial isolates were identified on basis of cultural characteristics, colony morphology, Gram staining and biochemical tests.¹⁶ The isolated and purified bacterial isolates were preserved by glycerol method. The antibiotic sensitivity was determined by disc diffusion Kirby Bauer method on Mueller Hinton (MH) agar plates. The antibiotic discs were purchased from market. The zones of inhibition around discs were noted and reported.¹⁷ To check the prevalence, percentages were calculated wherever required.

Results

For samples collection, patients of both genders were divided into four groups according to their ages (**Table-1**). Female patients were observed more (305) as compared to male patients (195). In **Table II**, bacterial isolates according to different age groups are reported. E. coli was found in all age

Table-1: Gender ratio according to age group.

Group	Age (in years)	Genders	No. of Pts. (n=500)
Group-1	15-25	Male	35
		Female	101
Group-2	25-40	Male	92
		Female	109
Group-3	40-60	Male	42
		Female	41
Group-4	Above 60	Male	26
		Female	54
Total		Male	195
Total		Female	305

Groups. Klebsiella and S. aureus were present from

15 to 40 years of age. Streptococcus was observed in groups 2 and 3. Enterococcus and P. aeruginosa were present only in group 3 (**Table-2**). Among all isolates obtained in this study, E. Coli showed highest frequency (71 %) followed by S. aureus and Klebsiella i.e. 10 % each. Remaining other isolates including Streptococcus, Enterococcus and P. aeruginosa were present as 3 % (**Table-3**). The antibiotic susceptibility pattern of all isolates is given in **Table-4**.

Table-2: Bacterial isolates in different age groups.

Group	Age (in years)	Bacterial isolates
Group-1	15-25	E. coli, Klebsiella, S. Aureus
Group-2	25-40	E. coli, Klebsiella, S. aureus, Streptococcus
Group-3	40-60	E. coli, Streptococcus, Enterococcus, P. Aeruginosa
Group-4	Above 60	E. Coli

Table-3: Prevalence of gram positive and gram negative bacterial isolates.

Gram Staining	Microorganisms	Frequency
Gram Positive	Streptococcus	3%
	Enterococcus	3%
	S. Aureus	10%
Gram Negative	E. Coli	71%
	Klebsiella	10%
	P. Aeruginosa	3%

Table-4: Antibiotic sensitivity of all bacterial isolates .

Microorganisms	Antibiotics Sensitivity
Streptococcus, Enterococcus, S. Aureus	Vancomycin, Linzolid, Nitrofurantoin, Cephadrin, Penicillin, Ampicillin
E. Coli, Klebsiella, P. Aeruginosa	Imipenem, Nitrofurantoin, Gentamicin, Amikacin, Sulfzone, Tazocin, Meropenem, Cefuroxime, Polymyxin B, Colistin

Discussion

UTI is considered as one of the complication in patients suffering from nephrotic syndrome (NS). According to the present study, more females were found suffering from UTI as compared to males. Our finding is in agreement with previous work.^{12,18} But in Baghdad, high ratio of males was observed.¹⁹ The factors that contribute to high female ratio includes close existence of female urinary system (small urethral opening) and reproductive system (close proximity of vagina and anus), less awareness

of sex education regarding usage of contraceptive agents (spermicidal agents, diaphragm) and overall cleanliness of reproductive organ.¹² Although microbial flora varies with age but *E. coli* was found in all age groups from 15 years to above 60. In this study, *E. coli* contributed more, followed by *Klebsiella* and *S. aureus*. Our finding of *E. coli* confirmed Minardi et al.¹⁸ who observed 80 % *E. coli* in patients under 50 years. *E. coli* was also observed in elder age woman of 90 years.²⁰ Here least observed bacterial isolates were *Streptococcus*, *Enterococcus* and *P. aeruginosa* which were found as 3 % each. In this study, only 3 % *Enterococcus* was found which is in contrast with the previous work conducted in China.²¹ The frequencies of *E. coli* (20 %, 29 %), *Klebsiella* (8 %, 22 %), *S. aureus* (6 %, 14 %) were reported previously^{12,22}, respectively. Ezeji for¹² also reported *Pseudomonas* (7 %) and *Streptococcus* (7%). *E. coli*, *Klebsiella*, *S. aureus* and *Pseudomonas* were also observed in Nigeria¹⁰ and Bangladesh.¹⁹ *Pseudomonas* was also reported in patients between 40-60 years of age.¹⁰ Childhood *E. coli* and *Klebsiella* were reported from Colombia, South America.²³ NS is common in Pakistani and Nigerian children where bacterial invasion resulted in UTI.^{8,24}

In last decades, *E. coli* was reported to be highest prevalent microorganism in UTI patients.²⁵ The bacterial flora of males consisted of *E. coli*, *S. aureus*, *Klebsiella*, *Enterococcus* and *Streptococcus*.¹¹ According to Sreeivasan et al.,²² UTI should be treated as soon as possible because if left untreated, the complications like hypertension, reflux nephropathy and chronic renal failure would likely to occur.

Adeleke and Asani¹⁰ reported the resistance of *S. aureus*, *Klebsiella* and *Pseudomonas* to nalidixic acid and ampicillin but sensitivity to cefotaxime, ceftriazone and ciprofloxacin. According to Echeverri et al.,²³ childhood *E. coli* and *Klebsiella* showed resistant to most antibiotics but they were sensitive to amikacin. In our study, Gram positive bacteria were sensitive to vancomycin,²² linezolid, ampicillin, nitrofurantoin, cephradine and penicillin which agrees with findings of Manhal et al.²² who revealed sensitivity of amikacin, gentamicin, ceftazidime, cefoxitin and imipenem for isolated bacterial species *E. coli*, *Klebsiella* and *Streptococcus*. Similar sensitivity pattern were reported previously.^{10,21} Sreenivasa et al.²² he isolates sensitive to aminoglycosides and 3rd generation cephalosporins. In NS patients, UTI is caused by *E. coli* is common and major microorganism so far.

Conclusion

In this study, it was concluded that females were more affected by NS and faced UTI as complication. Major microorganisms associated with such patients were *E. coli*, *Klebsiella*, *S. aureus*, *Enterococcus*, *Streptococcus* and *P. Aeruginosa*. These microorganisms were found to be sensitive to large range of antibiotics The awareness about cleanliness of reproductive system and sex education can help in decreasing the UTI in NS patients especially females.

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