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Organisms causing urinary tract infection among pediatric patients presenting at abbasi shaheed hospital, Karachi

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ABSTRACT

Objective: To assess the organisms causing urinary tract infection in pediatric patients presenting at Abbasi Shaheed Hospital, Karachi.

Methodology: This cross sectional study was conducted at Paediatric Department of Abbasi Shaheed Hospital, Karachi, from March 2016 to September 2016. All the patients with UTI for more than 48 hours, age 6 months to 12 years, of either gender were enrolled in the study. The urine specimens were taken in a sterile manner by a researcher from each patient and sent to the hospital laboratory for a culture test. Antibiotics were discontinued for 72 hours before the collection of urine samples. Urine specimens were submitted to the laboratory in 1 hour of collection. All the data was recorded in the proforma.

Results: Overall 174 subjects with urinary tract infection were studied, their mean age was 4.14±1.09 years. Female children were in majority 103 (59.2%). The most common bacterial pathogens were Escherichia Coli 74 (42.5%) and Klebsiella Pneumoniae 59(33.9%) followed by Proteus 24(13.8%), Pseudomonas Aeruginosa 13 (7.5%), and Staphylococcus Aureus 04 (2.3%). Escherichia Coli was insignificantly associated with age groups, while Klebsiella Pneumoniae, Proteus, Pseudomonas Aeruginosa, and Staphylococcus Aureus were found significantly associated with the age group of 7-9 years, p-values were quite significant. There was no significant difference among bacterial pathogens according to gender; p-values were quite insignificant.

Conclusion: Escherichia Coli, Klebsiella Pneumoniae, and Proteus were the commonest pathogens, causing urinary tract infection among children.

Key Words: Children, UTI, Pathogens

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Introduction

Infection of the urinary tract(UTI) is characterized by the presence of a large number of bacteria within the urine followed by signs or symptoms of infection.[1] UTI is an imperative factor for bacteremia due to gram negative species and during the first 2 years of a person's life, it is an important factor for death and morbidity.[2] UTI may decrease the incidence of morbidity and possibly fetal bacteremia if diagnosed timely and with antibiotics' administration.[3] It has also been reported that approximately 1 percent of boys and 3-5 percent of girls develop a UTI.[4] UTIs, if remain untreated, can lead to lesions of the kidney and permanent damage to a kidney which leads to renal failure and hypertension.[5] It is therefore evident that an accurate and an optimal UTI diagnosis in children is really important.[6] The incidence of UTI among newborns varies between 0.01% and 1% and in babies with low birth weight (LBW) and preterm babies it can also be as high as 10%. After an initial incident, any infant with a suspected UTI needs investigation.[7-8]

Clinical symptoms of UTI among newborns are often non-specific and of a systematic nature such as fever, vomiting, lethargy, irritability, lack of development, abnormal urination (that is, oliguria, malodorous urine or polyuria, and jaundice.[9] Also, due to non-specific symptoms it is challenging to diagnose UTI. Among infants, most UTIs are attributed to bacilli (gram-negative). In several studies, E. coli was the most

common organism that caused UTI across all ages, such as the neonatal time frame, representing up to 80 percent of isolates.[10,11] Further Enterobacteriaceae resulting in UTI among newborns include Morganella, Serratia, Proteus, Klebsiella, Citrobacter, Providencia, Salmonella, and Enterobacter. Gram-positive pathogens such as Enterococcus and Staphylococcus have been isolated from UTI infected newborns in lesser amounts.[12] The diagnosis of the UTI is dependent on symptoms in addition to urinalysis, pyuria presence and positive urine-culture. Pediatric healthcare professionals also encounter the challenge of UTI.[13] The significance has been slowly recognised over the last decades in its particular role as the mystical causes of infant febrile. The emergence of a body of knowledge about UTI among infants leaves several doubts and disagreements.[13] This research was therefore undertaken to determine the prevalence of species contributing to UTI among pediatric cases reported at Abbasi Shaheed Hospital, Karachi, to ascertain the recent local context as there is a lack of local data.

Methodology

This cross-sectional study was conducted at Pediatric Unit in Abbasi Shaheed Hospital, Karachi's. The study duration was 6 months between March 2016 and September 2016. Before undertaking this study permission was received from the institutional ethical review committee. In the study, patients with UTI for above 48 hours and both genders with 6 months to 12 years of age were involved. The exclusion criteria for this study was employed to all non-consenting patients, patients with a history of meningitis, pneumonia, malnutrition, and congenital cardiac disease. A short history regarding the length of the infection was taken from mothers. The researcher took the urine samples, in a sterile fashion, from the patients. Using supra pubic process, the sampling of urine in children was performed. The urine extraction was performed by urinary catheterization and supra pubic puncture in uncooperative or moribund patients. For infants and older children, after rinsing the genital sites with water and soap, the urine collection was conducted in sterilized bottles and urine collection bags. Early morning, mid-stream and Clean catch of specimens was carried out in sterilized containers. Antibiotics were discontinued for 72 hours before sending the urine samples for culture. Urine specimens were submitted to the laboratory in 1 hour of collection. A sample was taken as positive for UTI if culture of a single organism was done at $\geq 10^5$ CFU/mL of concentration, or if culture of a single organism was done at 10^4 CFU/mL of concentration and ≥5 leukocytes per high-power field was seen on the microscopic investigation of the urine. Identification of Bacteria was based upon biochemical characteristics and standard culture of isolates. All the findings were entered in the study self-made Performa. Data was analyzed by SPSS 16.0. Mean and standard deviations for the quantitative variables such as age and duration of symptoms of UTI were calculated. Percentages and frequencies for the qualitative variables such as organisms, socioeconomic status, and gender were calculated. Effect modifiers were regulated via stratification of gender and age. χ^2 test was applied and p-value ≤0.05 as statistically significant.

Results

Of 205 patients 174 were with a positive culture, while the remaining 31 cases were with negative culture, and these were excluded. The selected patient's mean age was 4.14±1.09 years, with an age range of minimum 6 months and a maximum of 11 years. The commonest age group was 10-12 years among 37.36% of the cases. Out of 174 patients, females were in majority as 103(59.2%), and male were 71(40.8%). Most of the cases 82(47.1%) were with poor socioeconomic status, and the remaining 70(40.2%) and 22(12.6%) cases belonged to the middle and upper class of socioeconomic status respectively. According to the duration of urinary symptoms, 93(53.4%) had a history of symptoms <5 days, while (46.6%) had history of symptoms >5 days respectively. Table no I

Among a total of 174 patients having urinary tract infection, common bacterial pathogens were found as; Escherichia Coli 74(42.5%), Klebsiella Pneumoniae 59(33.9%), Proteus 24(13.8%), Pseudomonas Aeruginosa 13(7.5%), and Staphylococcus Aureus 04(2.3%). Escherichia Coli and Staphylococcus Aureus were insignificantly associated with age groups p-value 0.269 and 0.668 respectively, while Klebsiella Pneumoniae, Proteus and Pseudomonas Aeruginosa were found significantly associated with age group of 7-9 years, p-values 0.001, 0.003 and 0.009 respectively. Table no II

There was no significant difference among bacterial pathogens according to gender; p-values were quite insignificant. Table no III

Table No I: Baseline characteristics of patients n=174

	VARIABLES	FREQUENCY	PERCENTAGE
	6 months to 3 years	20	11.49%
Age groups	4-6 years	44	25.29%
	7-9 years	45	25.86%
	10-12 years	65	37.36%
Gender	Male	71	40.80%
	Female	103	59.20%
Socioeconomic	Lower	82	47.13%
Status	Middle	70	40.23%
	Upper	22	12.64%
Duration of	<5 Days	93	53.45%
symptoms	>5 Days	81	46.55%

Table No II: Organisms distribution according to age (n=174)

Organisms	Age Groups					P-Value
	6 months to 3 years	4-6 years	7-9 years	10-12 years	Total	
Escherichia coli	12 (16.2%)	19(25.7%)	20 (27.0%)	23 (31.1%)	74(100%)	**0.269**
Klebsiella pneumoniae	08 (13.6%)	17(28.8%)	25(42.4%)	09 (15.3%)	59(100%)	**0.001**
Proteus	04 (16.7%)	08(33.3%)	11(45.8%)	01 (4.2%)	24(100%)	**0.003**
Pseudomonas aeruginosa	00 (00%)	03(23.1%)	07(53.8%)	03(23.1%)	13(100%)	**0.009**
Staphylococcus aureus	00 (00%)	01 (25%)	02 (50%)	01 (25%)	04(100%)	**0.668**

Table No III: Organisms distribution according to Gender (n=174)

Organisms	Gender			P-Value
	Male	Female	Total	
Escherichia coli	28 (37.8%)	46 (62.2%)	74(100%)	0.493
Klebsiella pneumoniae	26 (44.1%)	33 (55.9%)	59(100%)	**0.530**
Proteus	09 (37.5%)	15 (62.5%)	24(100%)	**0.723**
Pseudomonas aeruginosa	07 (53.8%)	06 (46.2%)	13(100%)	**0.320**
Staphylococcus aureus	01 (25%)	03 (75%)	04(100%)	**0.515**

Discussion

In several cases, urinary tract infection (UTI) is the most common infection among children, leading to end-stage kidney dysfunction and renal damage. UTI is the second most common disease in the pediatric age group. The mean age in our analysis was 4.14±1.09 years. Correspondingly, Moorani KN et al[14] found comparable average age-related findings of 3.05 ± 2.9 years. Males in this study were (40.8%) less than females (59.2%). Likewise, Anis-ur-Rehman MJ et al[15] reported 79.5% of females and 20.5% males. Afridi et al[16] found 44 girls and 56 boys out of 100 children in their study; further, 30% of infants were aged between 3 and 12 months, 52% aged between 1 and 5 years and 18% were aged above 5 years.

In our study, out of 174 UTI cases, frequent bacterial pathogens included 33.9 Klebsiella Pneumoniae, 42.5% Escherichia Coli, 2.3% Staphylococcus Aureus, 7.5% Pseudomonas Aeruginosa, and 13.8% Proteus. In the study of Wani KA et al[17] E. coli (85% cases) was the commonest pathogen followed by Klebsilla and Citrobacter (10.0% and 5% cases, respectively). In the study of Afridi JK et al[16] the most frequent isolated pathogens included 63.0% E.coli, 8.0% Klebsiella pneumoniae and 8% Proteus mirabilis, after that Staphylococcus (5.0%) and Pseudomonas auerogenosa (7.0%).

Yasmeen et al[18] stated that 182 (20.73%) of the 878 urine specimen were positive for pathogenic species. Afterwards, Acinatobacter spp., Pseudomonas spp., Staphylococcus aureus, Streptococcus (Group D), Enterobacter spp., and Klebsiella spp., accounted for 85.16 percent of the many other isolated pathogenic species. And there are others.[18] A further study revealed a female to male ratio of 1.8:1 (female 65.1%, male 34.9%). The typical presenting symptoms included flank pain, restlessness due to pain, fatigue, Fever and dysuria. E.Coli (65.1%) was the most common isolated species following E. Fecalis (with 20.8%).[19]

The period of urinary symptoms under this study were as follow; 93(53.4%) with symptom history below 5 days, whereas (46.6%) cases were with symptom history above 5 days, these results were almost identical to the research of Salunkhe S et al[20] where 2 to 5yrs of symptoms duration was found among 54.07% cases and duration of symptoms ranging from 5 to 12yrs was found among 37.4% cases. Majority of 82(47.1%) cases within this study had low socioeconomic status (SES), and the other 22(12.6%) and 70(40.2%) cases were found with upper and middle SES respectively. Salunkhe S et al[20] found 31.85% cases with lower SES, proving lower SES as an extraneous factor for Urinary tract infection.

Anis-ur-Rehman MJ et al[15] disclosed the majority of the 60% cases with failure to thrive as the most frequent presentation, which may be explained by low level of malnutrition, poor hygiene, poverty, circumcision delay and insufficient health-related facilities. Rao KR et al[21] revealed 76.6% cases with lower SES and High UTI-prevalence among lower SES because of poor perineal care and toilet habits.[21]

Conclusion

Escherichia Coli, Klebsiella Pneumoniae and Proteus were the commonest pathogens, causing urinary tract infection among paediatric patients. Mostly pathogens were found significantly associated with the age group of 7-9 years. There was no significant association of gender with bacterial pathogens. The resistance pattern of uropathogens resulting in UTIs to common antimicrobial agents is shifting and it must be considered in the selection of treatment strategies.

References

1. Adedoyin OT, Oyeyemi BO, Aiyedehin OV. Screening of febrile children on hospital admission for urinary tract infections (UTI). Afr J Clin Exp Microbiol. 2003;4:1-2.
2. Jadresi´c LP. Diagnosis and management of urinary tract infections in children. Paediatr Child Health. 2010;6:274-78.
3. Mortazavi F, Shahin N. Changing patterns in sensitivity of bacterial uropathogens to antibiotics in children. Pak J Med Sci. 2009;25:801-05.
4. Biyikli NK, Alpay H, Ozek E, Akman I, Bilgen H. Neonatal urinary tract infections: Analysis of the patients and recurrences. Pedtr Int 2004;46:21-25.
5. Schnadower D, Kuppermann N, Macias CG, Freedman SB, Baskin MN, Ishimine P, et al. Febrile infants with urinary tract infections at very low risk for adverse events and bacteremia. Pediatrics, 2010:126(6):1074–1083.
6. Doern CD, Richardson SE. Diagnosis of urinary tract infections in children. Journal of clinical microbiology. 2016 Sep 1;54(9):2233-2242.
7. Fallahzadeh MH, Alamdarlu HM. Prevalence of urinary tract infection in pre-school febrile children. Iranian J Med Sci. 1999;24:35-39.
8. VU Muoneke, MU Ibekwe, RC Ibekwe. Childhood Urinary Tract Infection In Abakaliki: Etiological organisms and antibiotic sensitivity Pattern. Ann Med Health Sci Res. 2012;2:29-32.
9. Taheri PA, Navabi B, Khatibi E. Frequency and susceptibility of bacteria caused urinary tract infection in neonates: eight-year study at neonatal division of bahrami children's hospital, Tehran Iran. Iranian journal of public health. 2013;42(10):1126.
10. Saleh SI, Tuhmaz MM, Sarkhouh MY, El-Ghawabi MA. Urinary tract infection in children in Al-jahra area, Kuwait: An overview. Kuw Med J 2003;35(1):31-35.
11. Beetz R, Westenfelder M. Antimicrobial therapy of urinary tract infections in children. Int J Antimicrob Agents. 2011;38:42-50.
12. Kline KA, Lewis AL. Gram-positive uropathogens, polymicrobial urinary tract infection, and the emerging microbiota of the urinary tract. Microbiology spectrum. 2016;4(2): 459-502.
13. Zorc JJ, Kiddoo DA, Shaw KN. Diagnosis and management of pediatric urinary tract infections. Clinical microbiology reviews. 2005;18(2):417-422.
14. Moorani KN, Parkash J, Lohano MK. Urinary tract infection in children undergoing diagnostic voiding cystourethrography. J Surg Pak. 2010 ;15:68-72.
15. Anis-ur-Rehman MJ, Siddiqui TS, Idris M. Frequency And Clinical Presentation Of Uti Among Children Of Hazara Division, Pakistan. J Ayub Med Coll Abbottabad. 2008;20(1):63.
16. Afridi JK, Afridi MA, Karim R, Munir A. Causative organisms and their sensitivity pattern of urinary tract infection in children of a Tertiary Care Hospital. KJMS. 2014 ;7(2):291.
17. Wani KA, Ashraf M, Bhat JA, Parry NA, Shaheen L, Bhat SA. Paediatric urinary tract infection: a hospital based experience. Journal of clinical and diagnostic research: JCDR. 2016 Oct;10(10):SC04.
18. Yasmeen BN, Islam S, Islam S, Uddin MM, Jahan R. Prevalence of urinary tract infection, its causative agents and antibiotic sensitivity pattern: A study in Northern International Medical College Hospital, Dhaka. Northern Intern Med Coll J. 2015;7(1):105-109.
19. Gul Z, Jan AZ, Liaqat F, Qureshi MS. Causative organisms and antimicrobial sensitivity pattern of pediatric urinary tract infections. Gomal J Med Sci. 2015;13(2):118-122.
20. Salunkhe S, Jadhav R, Agarkhedkar S. Clinical profile and socioeconomic demography in children with urinary tract infection. IJBAMR. 2016:5(3):637-642.
21. Rao KR, Gandhi SS, Kokiwar PR. Clinical study of urinary tract infection in children. International Journal of Contemporary Pediatrics. 2016 ;3(1):214-217.