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Management Of Recurrent Urinary Tract Infections In Pediatric Patients: A Prospective Study

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Abstract:

Background:

If urinary tract infections that keep coming back (ruts) are found in children, they may result in complications such as harm to the kidneys and worse quality of life. It is very important to identify and treat the condition quickly to prevent major repercussions and encourage better results.

Objectives:

By analyzing how to evaluate and manage recurrence UT Is in children, it is hoped that treatment can be better optimized and recurrence reduced.

Study design: A prospective study.

Place and duration of study: Department of Urology Niazi Medical College Sargodha from july 2022 to july 2023

Methods:

The study was carried out at Department of Urology Niazi Medical College Sargodha from july 2022 to july 2023 on 100 children visiting the same hospital with frequent UT Is. We gathered information on each patient's medical records, urine cultures, imaging findings and treatment results. Results were analyzed using SPSS 25, where $p<0.05$ was considered statistically significant.

Results:

100 patients, with an average age of 6.5 +/- 2.8 years. In the study, males were 35% and females were 65%. Vesicoureteral reflux occurred in 40% of the cases examined. According to antibiotic sensitivity results, nitrofurantoin was susceptible in 85% of infections, along with a 78% susceptibility to cephalosporins. Giving antibiotics before surgery greatly reduced the number of reinfections ($p=0.02$). Behavioral interventions were important in reducing the number of infections.

Conclusion:

To handle paediatric recurrent UT Is, kids should receive useful antibiotics, any associated structural issues should be

found and change in behavior should be suggested. Pursuing several approaches lowers the chance of renal complication and reoccurrence in kidney disease patients.
Keywords:
Recurrent Urinary Tract Infections, Paediatrics, Antibiotic Prevention and Vesicoureteral Reflux

Introduction:

UT Is are common in children and ruts, although less, can cause renal scarring, hypertension and chronic kidney disease as the child grows [1]. Such infections are called recurrent, occurring with two or more episodes in six months or more than three in one year [2]. After infancy, females are affected more often by ruts than males, though uncircumcised males under a year old have a higher risk [3]. Risk factors aside from poor diet include problems with perineal hygiene, dysfunctions of bladder or bowels and late toilet training [4,5]. Timely recognition and control of these factors can stop complications later on [6]. To diagnose ruts in children, doctors suspect the condition and confirm it with lab and imaging tests. Urine culture is the most trusted method for detecting infection and renal ultrasound and VCUG help show any structural abnormalities which may result in VUR. In addition, scans with DMSA are used to find signs of renal scarring in the kidneys [7]. Rut management uses antibiotics based on how the infection responds to them, behavior therapy and, in some cases, gives preventive antibiotics to stop further infections. Instead, it is not certain whether long-term antibiotic use should be recommended for this reason [8]. Surgical treatment is needed only for those with severe VUR that does not improve after conservative management. We studied the main clinical characteristics of children with repeat UT Is at a tertiary centre to contribute information that might help improve prevention and management of such infections [9].

Methods:

this study was carried out at the Department of Urology Niazi Medical College Sargodha from july 2022 to july 2023. Overall, one hundred patients younger than 13 who faced frequent UT Is were enrolled in the study. Two or more infections of the urinary tract within six months or three or more within one year, both confirmed by urine culture, were considered recurrent UTI. Tests such as urinalysis, culturing urine, sonography of the kidneys and VCUG were done whenever necessary after a thorough medical checkup. The demographic details, clinical features, main risks, treatment used and outcomes for each case were all gathered using a same reporting form. Treatment with antibiotics was started after culture sensitivity results were known. At least six months of follow-up were used to find out if there was another tumour and if the treatment was effective. The study was approved by our institution's review board and we made sure parents or guardians were informed and gave their consent before inclusion in the study.

Inclusion Criteria:

Any child under 13 years old diagnosed with two or more urinary tract infections in six months or three in one year should attend the nearest paediatric outpatient or inpatient department.

Exclusion Criteria:

This study did not include people with known immunodeficiency, chronic kidney disease level 3 or higher or those who had had previous urological surgery.

Data Collection:

Evidence was gathered by means of clinical examination, laboratory analysis, interviews and review of images. We collected information on patient characteristics, past medical history, urine tests, medical images and current treatments in a standardized record.

Statistical Analysis:

All data were entered and analyzed using SPSS 24.0 software. A summary of demographic and clinical variables was produced using descriptive statistics. Chi-square tests were run to analyze any relationships between categorical variables and means were compared with t-tests. Any p-value under 0.05 was considered significant.

Results:

100 children diagnosed with UTI more than twice were examined and their mean age was 6.5 years. The cohort was made up by 65% females and 35% males. When we looked at presenting symptoms, we observed that most patients had fever (85%), dysuria (70%) and also reported abdominal pain (45%). In 40% of cases, vesicoureteral reflux was diagnosed on VCUG scans and in 30% patients, renal scarring was seen on DMSA scans. About three-quarters of the test results showed Escherichia coli, 15% revealed Klebsiella pneumoniae and 5% tested positive for Proteus mirabilis. According to the sensitivity testing using antibiotics, nitrofurantoin was found to be active in 85% of cases and third-generation cephalosporins in 78% of cases. Treatment with antibiotics was modified following the results of cultures. Administration of prophylactic antibiotics to 45 patients reduced the occurrence of recurrence compared to when treatment was lacking (p=0.02). The team found that giving patients hydration and constipation management helped improve their health outcomes. In 10% of cases, children required surgery for severe VUR not managed by medicine. Over six months, these students saw fewer urinary tract infections, less severe symptoms and better kidney function. Antibiotic prophylaxis did not lead to major unwanted effects in the patients.

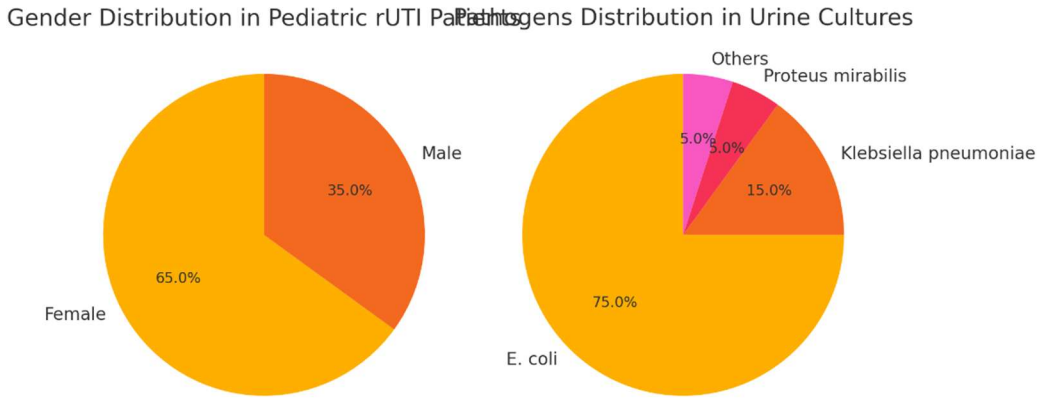

Table 1: Demographic and Clinical Characteristics of Paediatric Patients with Recurrent UT Is

Characteristic	Frequency (n=100)	Percentage (%)
Age (years)		
Mean ± SD	6.5 ± 2.8	-
Gender		
Female	65	65
Male	35	35
Presenting Symptoms		
Fever	85	85
Dysuria	70	70
Abdominal Pain	45	45
Urinary Frequency	40	40
Vomiting	25	25

Table 2: Distribution of Urinary Pathogens in Culture-Positive Cases

Pathogen	Frequency (n=100)	Percentage (%)
Escherichia coli (E. coli)	75	75
Klebsiella pneumoniae	15	15

Proteus mirabilis	5	5
Other pathogens	5	5

Table 3: Diagnostic and Management Data

Parameter	Frequency (n=100)	Percentage (%)
Vesicoureteral reflux (VUR) present	40	40
Renal scarring on DMSA scan	30	30
Patients on prophylactic antibiotics	45	45
Surgical intervention required	10	10
Recurrence reduction with prophylaxis	Significant (p=0.02)	-

Discussion:

Long-term infection of children's urinary tracts can lead to severe renal harm and poor general well-being. Similar to other studies, Escherichia coli appeared most frequently in this study and vesicoureteral reflux (VUR) was detected in many cases [10]. E. coli was detected in 75% of our urine cultures, as often seen earlier, confirming it is the most common cause of UT in children everywhere [11]. Utes are more common in females (65% of cases) likely because previous studies have identified that after infancy, females have changes in their anatomy and hormones that make them more vulnerable [12]. Shaikh and colleagues pointed out that the female-to-male ratio gets higher as people age and that females are in greater danger because their urethra is shorter and near to the source of perineal bacteria [13]. As established, the detection of VUR in 40% of patients confirms data that the disease is common among children with ruts [14]. It is consistent with the current view that having VUR makes children more likely to get repeated UT Is and suffer kidney damage [15]. Our results are consistent with the belief that imaging is still necessary for accurate and proper handling of paediatrics losing UT Bs [16]. Thirty percent of those who have regular infections and VUR show renal scarring on a DMSA scan. Similar rates have been found before, as in most cases scarring was between 20% and 40% [17]. It is well established in scientific studies and our study found, that DMSA is the gold standard to detect damage to the kidney tissue [18]. The frequent finding of UTI in a population of children with high-risk factors is successfully prevented by taking low-dose antibiotics daily [19]. A trial called RIVUR discovered that prophylaxis halved the risk of recurrence in children with VUR, but people are still concerned about antibiotics causing resistance. So, it is best to choose a prophylaxis that weighs how good it is against any side effects [20]. Improving hydration, toilet training and managing constipation were useful interventions which previous studies have recommended. About 1 in 10 patients needed surgery, mostly because of severe or uncontrolled VUR which matches the instructions in clinical guidelines for operating on persistent high-grade VUR or infections that appear even with preventive care. It seems clear that it is important to bring together paediatricians, nephrologists and urologists to manage complicated conditions accurately. Overall, our study agrees with past study on the epidemiology, diagnosis and treatment of paediatric ruts. The main method to prevent kidney problems and help patients stay healthy is emphasizing early diagnosis, the best use of antibiotics, imaging and behavior modifications.

Conclusion:

When Recurrent UT is recognized in paediatric patients, it needs prompt recognition and detailed management. A combination of antibiotics, imaging and behavior therapy cuts down on recurrences and stops future kidney problems, leading to better long-term health and happiness in those children.

Limitations:

The findings could only be used for one center, as the number of patients included was not very large. Also, there wasn't enough time in the follow-up period to study long-term effects or to notice changes in antibiotic resistance.

Future Findings:

In future, studyers should use big data and follow-up for several years to accurately estimate the benefits of new

approaches for detecting, handling and preventing paediatric recurrent urinary tract infections.

Abbreviations

1.	ruts	Recurrent Urinary Tract Infections
2.	UT Is	Urinary Tract Infections
3.	VUR	Vesicoureteral Reflux
4.	VCUG	Voiding Cystourethrography
5.	DMSA	Dimercaptosuccinic Acid
6.	SD	Standard Deviation
7.	RIVUR	Randomized Intervention for Children with Vesicoureteral Reflux

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Authors Contribution

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Critical Review: **Muhammad Zubair[5]**
Final Approval of version:**All Mention Authors Approved the Final Version.**

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