

STUDY OF URINARY TRACT INFECTIONS IN INFANTS WITH ACUTE FEVER IN INFANTS

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ABSTRACT

Background: Urinary tract infections (UTI) in infants develop certain anatomic and physiological factors like vesicoureteric reflux (VUT) which leads to repeated infections and other complications like pyelonephritis and renal failure if not treated at the early stage of UTI with acute fever. **Materials and Methods:** 90 infants admitted for fever were studied. Symptoms were increased frequency of micturition, crying while voiding, and pyuria. General and systemic examinations were done to rule them out. Phimosis, vulvular synechiae, suprapubic mass, renal mass, dysmorphic features, and associated congenital anomalies were observed. A provisional diagnosis was done mainly based on signs and symptoms. Routine urine analysis, microscopic analysis of urine, and urine culture were carried out. Positive patients were further examined by USG and MCU, and a differential diagnosis was also done to confirm the UTI. **Result:** The clinical manifestations were 90 (100%) with fever, 35 (38.3%) vomiting, 51 (56.6%) irritability, 63 (70%) failure to thrive, 11 (12.2%) jaundice, 19 (21.1%) convulsions. The co-morbidities were 26 (30.5%) gastroenteritis, 22 (25.8%) fever without focus, 11 (12.9%) URTI, 16 (18.8%) UTI, 7 (8.23%) septicemia, 3 (3.52%) bronchitis. The highest sensitivity drug was 77 (90.6%) amikacin, followed by 53 (58.8%) norfloxacin, 64 (71.7%) ofloxacin, gentamicin 17 (18.8%) Nitrofurantoin, and 14 (15.5%) nalidixic. **Conclusion:** The prevalence rate of UTI varies by gender, age, race, and circumcision status. The present study will help the clinician to rule out causes of UTI and treat efficiently.

INTRODUCTION

The clinical presentation of urinary tract infections (UTI) in infants and young children can vary from occult and undiagnosed fever to gastrointestinal manifestations as well as upper and lower urinary tract symptoms, whereas in older children, symptoms referring to the urinary tract may be observed.^[1] Infants and young children are at risk of developing UTIs due to certain anatomic and physiological factors, among which vesicoureteric reflex (VUR) is most common. VUR leads to repeated infections and other complications like chronic pyelonephritis and eventual renal scarring, which are components of reflux nephropathy.^[2] Hence, it is important to diagnose this condition at the appropriate time or at the earliest to prevent the renal damage.

Bacteria are a common cause of UTI in infants, with *Escheria* being the most commonly isolated pathogen.^[3] The aetiology of paediatric UTI and antibiotic susceptibility of urinary pathogens in both the community and hospitals have been changing, and drug resistance has become a major challenge to

paediatricians.^[4] Hence, an attempt is made to evaluate the UTI with acute fever in infants.

MATERIALS AND METHODS

90 (ninety) infants admitted to paediatric department of Marsleeva Medicity pala Cherpunkal Kezhuvankulam (post), Kottayam (dist), Kerala-686584 were studied.

Inclusive Criteria: Any febrile infant with an axillary temperature > 100 oF or 37.8 oC, irrespective of the provisional diagnosis. The parents or gaurdian who gave their consent in writing for study, were selected. **Exclusion Criteria:** Febrile infants who had received antibiotics before attending OPD and those requiring admission, intensive care therapy, and/or immediate antibiotics in cases of pyogenic meningitis, severe pneumonia, shock, or status epilepticus were excluded from the study.

Method: A detailed history was obtained with special emphasis on urinary symptoms such as increased frequency, crying while voiding, and pyuria. Complete general and systemic examinations were also done with attention to urological findings

such as phimosis, vulvular synechiae, suprapubic mass, renal mass, dysmorphic features, and other associated congenital anomalies. A provisional diagnosis was made mainly based on presenting signs and symptoms, intake-output charts, wound site infections, and other complications.

Mothers were trained through verbal instructions to collect urine using the CCU method in a sterile bottle. They were asked to clean the perineum with clean water, breast-feed the baby frequently, and apply mild pressure to the suprapubic area every 15 minutes.

In routine urine analysis, urine microscopy was done using uncentrifuged urine. An observation of more than 5 pus cells/high power field (HPF) was the threshold for pyuria, a positive diagnosis of UTI (5). For urine culture, the urine specimen was inoculated in MacConkey culture medium using the standard loop technique. The average time from urine collection to inoculation was 30 minutes. UTI was diagnosed only when a single uropathogen with CFU $\geq 105/\text{mL}$ was present, designated as significant growth. The growth of uncommon organisms such as staphylococcus, pseudomonas, and citrobacter and the growth of multiple organisms were considered signs of urine sample contamination. The culture-positive cases were tested for sensitivity by inoculating them in nutrient agar and using a combined gram-negative microbial sensitivity disk for UTI.

In culture-proven infants, further investigations such as abdominal ultrasonograms (USG), micturating cystourethrograms (MCU), and isotope scan studies were advised to determine the underlying anomalies of the renal tract. These infants were treated with appropriate antibiotics for 10 days and were asked to continue with prophylactic medication until all the imaging studies were over.

Differential Diagnosis of UTI – Inflammation of the external genitalia, vulvitis, and vaginitis caused by yeast, pinworms, and other agents may be accompanied by symptoms mimicking cystitis on the basis of history and the result of urine culture.

Radiologically, the hypoplastic or dysplastic kidney or a small kidney secondary to a vascular accident may appear similar to a kidney with chronic pyelonephritis; later, however, VUR (vesicoureteral reflux) is usually present.

Pyuria ($> \text{WBC}$ or HPF in a centrifuged specimen) is a hallmark of pyelonephritis with a sensitivity and specificity of 30–50%. However, pyuria alone is not sufficient for making a diagnosis, as a number of conditions are associated with sterile pyuria, including hydration, instrumentation, chemical inflammation, oral polio vaccine administration, non-specific gastroenteritis, and respiratory tract infection. Pyuria is strong, supportive evidence of UTI in the presence of a positive culture. Many (20–50%) patients with bacteriuria with UTI do not demonstrate significant pyuria. The most accurate method of measuring pyuria is to quantify the urinary leukocyte excretion rate.

The duration of the study was from March 2024 to June 2026.

Statistical analysis: Various clinical manifestations, provisional diagnosis, and antibiotic sensitivity of the organism were classified by percentage. The statistical analysis was carried out in SPSS software. The ratio of males and females was 3:1.

RESULTS

[Table 1] Clinical manifestations of UTI in infants: 90 (100%) fever, 35 (38.8%) vomiting, 51 (56.6%) irritability, 63 (70%) failure to thrive, 11 (12.2%) jaundice, 19 (21.2%) convulsion.

[Table 2] Provisional diagnosis of UTI infants: 27 (30%) gastroenteritis, 23 (25.5%) fever without focus, 11 (12.2%) URTI, 17 (18.8%) UTI, 8 (8.8%) septicaemia, 3 (3.3%) bronchitis.

[Table 3] Antibiotic sensitivity of organisms in urine culture samples: 81 (90%) Amikacin, 64 (71.1%) ofloxacin, 53 (58.8%) Norfloxacin, 37 (41.1%) gentamicin, 17 (18.8%) Nitrofuradantin, 14 (15.5%) Nalidixic acid, 9 (10%) ceftriaxane, and 11 (12.2%) ceftriaxone.

Table 1: Clinical manifestation of UTI Infants. (No. of patients: 90)

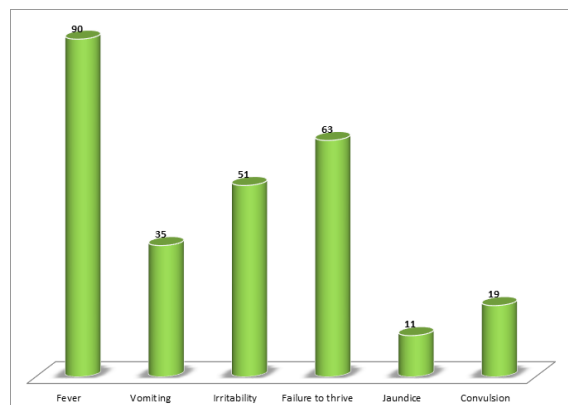
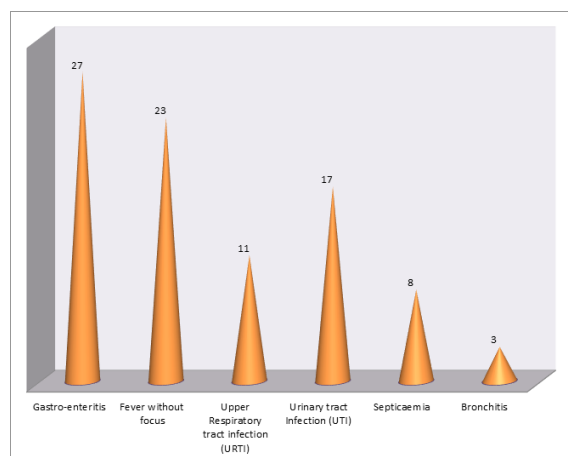
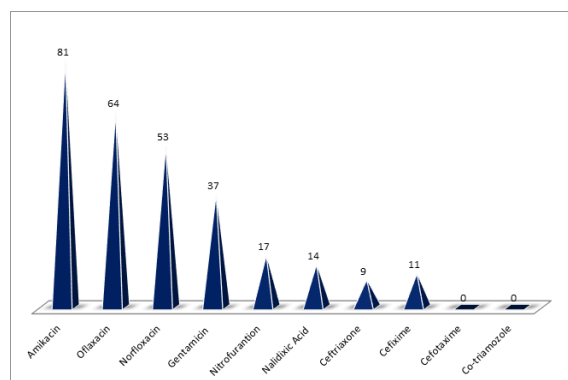
Clinical Manifestation	No. of patients (90)	Percentage (%)
Fever	90	100%
Vomiting	35	38.8%
Irritability	51	56.6%
Failure to thrive	63	70%
Jaundice	11	12.2%
Convulsion	19	21.1%

Table 2: Provisional diagnosis in UTI Infants (No. of patients: 90)

Provisional diagnosis	No. of Patients (90)	Percentage (%)
Gastro-enteritis	27	30
Fever without focus	23	25.5
Upper Respiratory tract infection (URTI)	11	12.2
Urinary tract Infection (UTI)	17	18.8
Septicaemia	8	8.8
Bronchitis	3	3.3

Table 3: Antibiotic sensitivity of organism growing in Urine Culture samples (No. of patients: 90)

Antibiotic	No. of patients	Percentage (%)
Amikacin	81	90.5
Ofloxacin	64	71.1
Norfloxacin	53	58.8
Gentamicin	37	41.1
Nitrofurantion	17	18.8
Nalidixic Acid	14	15.2
Ceftriaxone	9	10
Cefixime	11	12.2
Cefotaxime	0	0.0
Co-triamazole	0	0.0

**Figure 1: Clinical manifestation of UTI Infants****Figure 2: Provisional diagnosis in UTI Infants****Figure 3: Antibiotic sensitivity of organism growing in Urine Culture samples. (No. of patients: 90)**

DISCUSSION

Present study of UTI in infants with acute fever. The clinical manifestations were 90 (100%) fever, 35 (38.8%) vomiting, 51 (56.6%) irritability, 63 (70.1%) failure to thrive, 11 (12.2%) jaundice, 18 (21.2%) had convulsion [Table 1]. The provisional diagnosis of UTI was 27 (30.5%) gastroenteritis, 23 (25.5%) fever without focus, 11 (12.2%) URTI, 17 (18.8%) UTI, 8 (8.8%) septicemia, and 3 (3.3%) bronchitis [Table 2]. Antibiotic sensitivity of organisms growing in urine culture samples: 81 (90.5%) amikacin, 64 (71.7%) ofloxacin, 53 (58.8%) norfloxacin, 37 (41%) gentamicin, 17 (18.8%) Nitrofurantoin, 14 (15.2%) nalidixic acid, and 11 (12.2%) ceftriaxone [Table 3]. These findings are more or less in agreement with previous studies.^[6-8]

UTI is a very important clinical problem and a challenge for clinicians to diagnose. The infection usually involves pyelonephritis, which affects renal function in adulthood; hence, UTI in infants must not be ignored and treated meticulously.^[9] The risk of renal parenchymal damage from UTI manifested by subsequent renal scarring is strongly related to age at the time of UTI, being highest in infancy and declining markedly with increasing age.^[10,11] Renal scarring is associated with the later development of hypertension, preeclampsia, eclampsia, and end-stage renal disease.^[12]

It is reported that urine culture is used in the diagnostic evaluation of febrile infants < 3 months of age whose history or physical examination does not suggest serious illness.^[13] The presence of pyuria, defined as ≥ 5 leukocytes per high-power field, was a relatively insensitive indicator of UTI. Had urine culture been omitted because of the absence of pyuria, nearly half of the UTIs would not have been diagnosed.^[14] The presence of bacteriuria, defined as any number of bacteria per high-power field, was a more sensitive indicator, but it was not specific enough to identify infants with UTIs accurately.^[15]

It is also observed that UTI was higher in female children less than 2 years of age, but race or height in temperature was not correlated with UTI, but symptomatic or asymptomatic bacteria were higher in white girls than Black girls.

Several studies have reported that the dipslide culture method is valid, with standard quantitative cultures used as the gold standard in UTI of urine, and suprapubic aspiration is regarded as the ideal method

for collecting urine specimens. Though it is painful, the success rate for diagnosing UTI was 23% to 90%.

CONCLUSION

In the present study of UTI with acute fever in infants, urine culture was carried out in every patient because urine culture was a mandatory investigation in febrile infants, as there are no other alternate sensitive techniques available for immediately diagnosing UTI in febrile infants, and except when the cause of fever in such infants is unequivocal, clinicians have to alter the possibility that febrile infants may have UTI and should consider obtaining a urine culture specimen as part of their diagnostic evaluation. This study demands the latest techniques be explored for the immediate diagnosis of UTI in febrile infants because the present urine culture method is time-consuming and prolongs the morbidity of patients.

Limitation of Study: Owing to the remote location of the present study institution, small number of patients, lack of latest technique, we have limited findings and results.

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