

Study of Urinary Tract Infections in Infants with Acute Fever in North Karnataka Population

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Abstract:

Background: Urinary tract infection (UTI) is one of the most common pediatric infections. Infants with acute fever are identified by both pyuria and uropathogenic organisms. If untreated, it leads to hypertension, end-stage renal disease, and prolonged morbidity.

Method: 70 infants admitted for fever were studied. Symptoms were increased frequency of micturation, crying while voiding, and pyuria. General and systemic examinations were done to rule out them. Phimosi, vulvular synechiae, and 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.

Results: 70 (100%) fever, 26 (37.1%) vomiting, 40 (57.1%) irritability, 49 (70%) failure to thrive, 10 (14.2%) jaundice, 15 (21.4%) convulsion, 21 (30%) gastro-enteritis, 18 (25.7%) fever without focus, 10 (14.2%) URTI, 13 (18.5%) UTI, 6 (8.57%) septicaemia, and 4 (5.71%) bronchitis. The highest antibiotic sensitivity of the organism growing urine culture sample was 63 (90%) amikacin, followed by 51 (72%) laxacin, 41 (58.5%) norfloxacin, 20 (41.4%) gentamicin, and the least was 7 (10.5%) ceftriaxone.

Conclusion: The prevalence of UTI varies with age, sex, circumcision, and the hygienic status of infants. Urine culture should be an essential part of the evaluation of infants with fever.

Keywords: Fever, Urinary Tract Infection, Urine Culture, Pyuria, Macconkey Culture Media.

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Introduction

Urinary tract infection (UTI), a relatively common cause of fever in infancy, usually consists of pyelonephritis and may cause permanent renal damage if untreated. UTI is the most common type of severe bacterial infection in infants presenting with fever without a source.

Initial episodes of UTI occur more commonly in infancy than at any other age [1]. Predisposition factors include congenital obstruction, uterovesical valve dysfunction, immaturity of host defenses, and exposure through fecal soiling to pathogens that can enter the urinary tract. In febrile infants, the prevalence of UTI has ranged from 4.1% to 7.5% [2]. The variability in prevalence appears to be attributable to differences among studies in the age, sex, and race of the subjects. Fever is consistently present in infants with UTI. In some infants, it is associated with acute otitis media, gastro-enteritis, upper respiratory tract infection, and bronchitis. Hence, an attempt is made to study the UTI in in-

fants, its clinical manifestation, culture, and sensitivity.

Material and Method

70 (seventy) infants admitted to ESIC Medical College Kalaburagi (585102), Karnataka, were studied.

Inclusive Criteria: Any febrile infant with an axillary temperature > 100 oF or 37.8 oC, irrespective of the provisional diagnosis, was selected for study.

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 synechia, supra-pubic 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/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 cystourethograms (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, pin worms, 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 polynephritis; later, however, VUR (vesicoureteral reflux) is usually present.

Pyuria (> WBC or HPF in a centrifuged specimen) is a hallmark of polynephritis 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 November 2022 to December 2023.

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.

Observation and Results

Table 1: Clinical manifestations of UTI patients: 70 (100%) fever, 26 (37.1%) vomiting, 40 (57.1%) irritability, 49 (70%) failure to thrive, 10 (14.2%) jaundice, and 15 (21.4%) convulsion

Table 2: Provisional diagnosis in UTI infants 21 (30%) gastroenteritis, 18 (25.7%) fever without focus, 10 (14.2%) upper respiratory tract infections (URTI), 13 (18.5%) UTI, 6 (8.57%) septicaemia, and 4 (5.71%) bronchitis

Table 3: Antibiotic sensitivity of organisms growing in urine culture samples: 63 (90%) Amikacin, 51 (72.8%) ofloxacin, 41 (58.5%) Norfloxacin, 29 (41.4%) gentamicin, 12 (17.1%) Nitrofuradantin, 10 (14.2%) Nalidixic acid, 7 (10%) ceftriaxane, and 9 (12.8%) ceftriaxone.

Table 1: Clinical manifestation of UTI patients

Clinical Manifestation	No. of patients	Percentage %
Fever	70	100%
Vomiting	26	37.1 %
Irritability	40	57.1%
Failure to thrive	49	70%
Jaundice	10	14.2%
Convulsion	15	21.4%

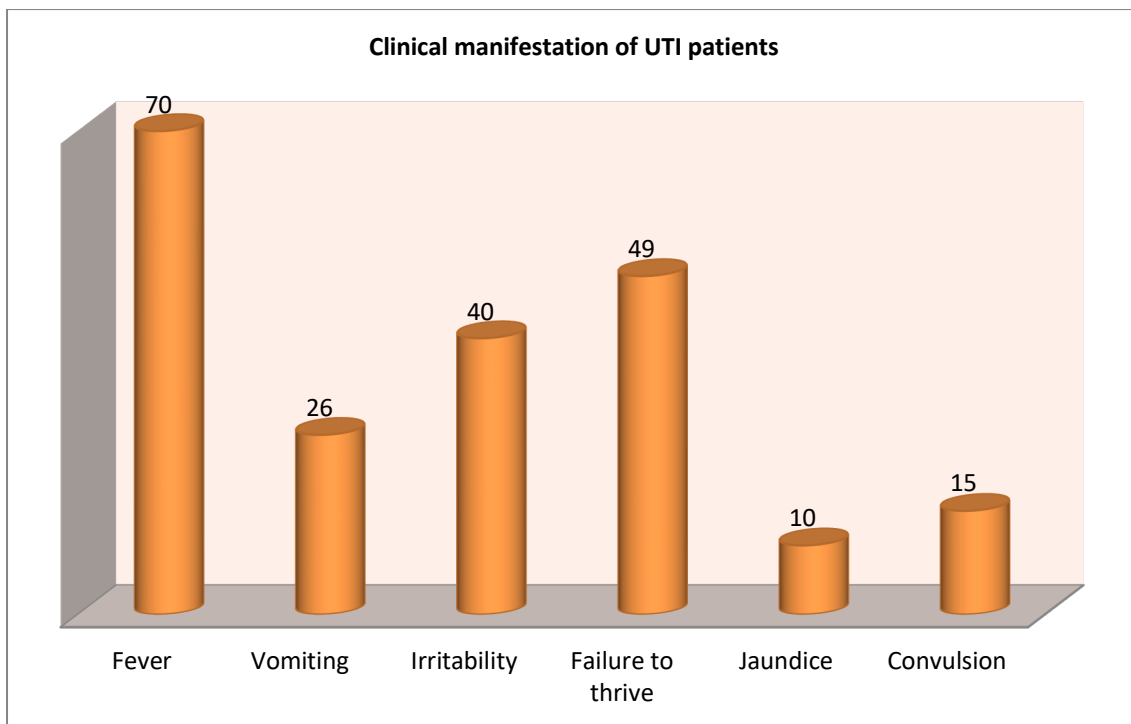


Figure 1: Clinical manifestation of UTI patients

Table 2: Provisional diagnosis in UTI in Infants

Particular	No. of Patients	Percentage %
Gastro-enteritis	21	30
Fever without focus	18	25.7
Upper Respiratory tract infection (URTI)	10	14.2
Urinary tract Infection (UTI)	13	18.5
Septicaemia	6	8.57
Bronchitis	4	5.71

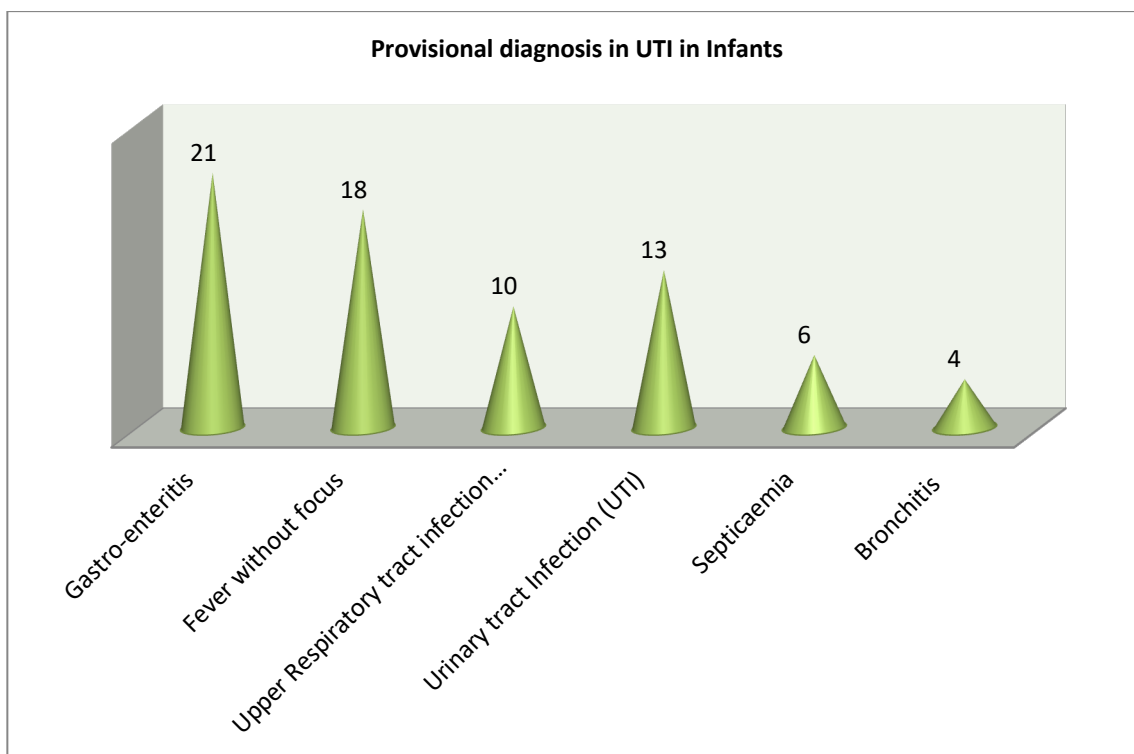
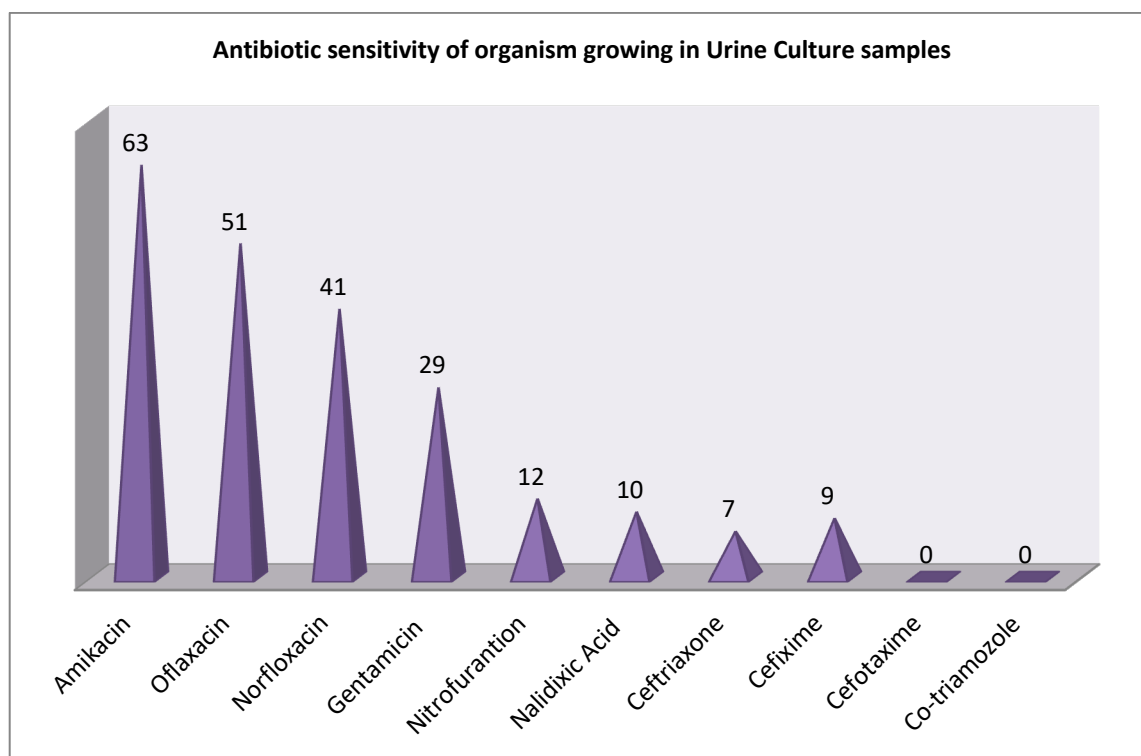


Figure 2: Provisional diagnosis in UTI in Infants

Table 3: Antibiotic sensitivity of organism growing in Urine Culture samples

Antibiotic	No. of patients	Percentage %
Amikacin	63	90
Oflaxacin	51	72.8
Norfloxacin	41	58.5
Gentamicin	29	41.4
Nitrofurantion	12	17.1
Nalidixic Acid	10	14.2
Ceftriaxone	7	10
Cefixime	9	12.8
Cefotaxime	0	0.0
Co-triamazole	0	0.0

**Figure 3: Antibiotic sensitivity of organism growing in Urine Culture samples**

Discussion

Present study of UTI infants with acute fever in the North Karnataka population. The clinical manifestations were 70 (100%) fever, 26 (37.8%) vomiting, 40 (57.1%) irritability, 49 (70%) failure to thrive, 10 (14.2%) jaundice, and 15 (21.4%) convulsion (Table 1). Provisional diagnosis in UTI infants included 21 (30%) gastro-enteritis, 18 (25.7%) fever without focus, 10 (14.2%) URTI, 13 (18.5%) UTI, 6 (8.37%) septicaemia, and 4 (5.71%) bronchitis (Table 2). The antibiotic sensitivity of organisms growing in urine culture sample study had 63 (90%) amikacin, 51 (72.5%) laxacin, 41 (58.5%) norflaxacin, 29 (41.4%) gentamicin, 12 (17.1%) nitrofurantoin, 10 (14.2%) nalidixic acid, 7 (10%) ceftriaxone, and 9 (12.8%) cefixine (Table 3). These findings are more or less in agreement with previous studies [9,10,11]. UTI is a very important clinical problem and a challenge for clinicians to diagnose. The infection usually involves polyne-

phritis, which affects renal function in adulthood; hence, UTI in infants must not be ignored and treated meticulously. 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 [12]. Renal scarring is associated with the later development of hypertension, preeclampsia, eclampsia, and end-stage renal disease [13].

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 [14]. 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 UTI's would not have been diagnosed [17]. The presence of bacteruria, 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 UTI 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%.

Summary and 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 because 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 tertiary location of the present study institution, the number of patients is limited, and we have limited findings.

This research paper was approved by the ethical committee of ESIC Medical College Kalaburgi (585102), Karnataka.

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