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RELIABILITY OF URINEANALYSIS FOR PREDICTING UTI IN YOUNG FEBRILE CHILDREN IN 2 TO 8 YEARS OF COASTAL REGION

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ABSTRACT : UTI is a common source of bacterial infection among young febrile children
AIM : To determine the validity of urinary tests in the diagnosis of urinary tract infection
METHODOLOGY : Febrile children from 2 years to 8 years.
CONCLUSION: Dipstick leucocyte esterase and nitrite test was highly specific and accurate in detecting UTI as compared to dipstick leucocyte esterase, dipstick nitrite test and urine analysis. Dipstick leucocyte esterase and nitrite test showed the highest PPV wherea dipstick leucocyte esterase showed highest NPV. No test can screen accurately for UTI in young children. The urine dipstick plus culture tests appear to be the most cost-effective strategy for screening and beginning presumptive treatment for UTI in febrile young children.

INTRODUCTION

A symptomatic bacterial infection inside the urinary system is referred to as a urinary tract infection (UTI). This comprises an upper urinary tract infection known as acute pyelonephritis or a lower urinary tract infection known as cystitis (symptomatic infection of the bladder) (symptomatic infection of the kidney). These classifications are based on a set of symptoms. However, the bacterial infection could spread beyond of the anatomical region that the language suggests. (1)

If a patient has two consecutive urine cultures that reveal >100 000 cfu/mL pee but no signs or symptoms of a UTI, they are said to have asymptomatic bacteriuria. Only in certain situations, such as those involving patients who are immunocompromised, pregnant women, or those undergoing urological surgery, is this handled.

If pyelonephritis symptoms appear or a UTI is discovered in a patient group that includes the immunosuppressed, males, pregnant women, diabetics, people who have had pyelonephritis in the past, or those who have structural abnormalities of the urinary system, it may be deemed difficult (2)

By the time they are seven, 8% of girls and 2% of boys had experienced at least one episode of an acute urinary tract infection. About 85% of paediatric urinary tract infections are caused by Escherichia coli, the most prevalent pathogen. Within one to two years of their first documented urinary tract infection, 3 to 15% of children have renal parenchymal abnormalities. The age of the child will determine the clinical signs and symptoms of a urinary tract infection, but all feverish children between the ages of two and 24 months who do not have a clear source of infection should be examined for a urinary tract infection (with the exception of circumcised boys older than 12 months).

Depending on the clinical appearance and symptoms that suggest a urinary source, evaluation of older children may vary (e.g., leukocyte esterase or nitrite present on dipstick testing; pyuria of at least 10 white blood cells per high-power field and bacteriuria on microscopy). Amoxicillin has been a less preferred option for therapy due to rising E. coli resistance rates, and studies have revealed that trimethoprim/sulfamethoxazole has a greater cure rate (3)

Cephalosporins and amoxicillin/clavulanate are further therapeutic possibilities. Even in children with mild to moderate vesicoureteral reflux, prophylactic antibiotics do not lower the incidence of recurrent urinary tract infections. Urinary tract infections may be prevented by avoiding constipation. In children with urinary tract infections, ultrasonography, cystography, and a renal cortical scan should be taken into account.

In youngsters, acute UTIs are quite prevalent. 8% of girls and 2% of boys will experience at least one episode by the age of seven. In a study of newborns who visited paediatric emergency rooms, 9 percent of infants under 60 days old with a fever higher than 100.4°F (38°C) had UTIs (4)

The reference standard for the diagnosis of a UTI is a single organism cultured from a specimen obtained at one of the following concentrations: a suprapubic aspiration specimen with more than 1,000 CFU/mL, a catheter specimen with more than 10,000 CFU/mL, or a clean-catch, midstream specimen with at least 100,000 CFU/mL. Although it hasn't been included into established standards, using lower colony counts in symptomatic individuals has been recommended.

Most often (80–90%) brought on by an infection with an Escherichia coli species. Klebsiella, Enterococcus, Proteus mirabilis, and Staphylococcus saprophyticus are some more reasons.

The first stage in a series of events leading to a UTI seems to be the pathogen's periurethral colonisation.

The GI tract, which serves as a natural reservoir for possible UTIs, contains the majority of the pathogenic germs.

Hypertension, chronic renal failure, and toxaemia during pregnancy are long-term UTI consequences linked to renal scarring. Even though there are few long-term follow-up studies, one Swedish research revealed that among individuals with renal scarring from childhood pyelonephritis, 23% went on to acquire hypertension and 10% went on to develop end-stage renal disease (5)

Recent research, however, have cast doubt on the link between pyelonephritis and end-stage renal disease. Up to 3.2% of healthy, tested neonates have been observed to have baseline urogenital tract abnormalities. In addition, obstructive abnormalities may occur in up to 4% of cases and vesicoureteral reflux can occur in between 8% and 40% of kids receiving treatment for their first UTI. Parenchymal defects may be more common in children under the age of two than in older children.

The goal of the current research is to determine the overall prevalence of urinary tract infections in children aged 2 to 8 who have fevers, as well as to evaluate the reliability of urinary tests including urine analysis and urine culture for the diagnosis of urinary tract infections (6)

MATERIALS AND METHODS

INCLUSION CRITERIA

Febrile children from 2 years to 8 years.

(<2years are not taken due to difficulty in urine collection in children who are not yet toilet trained)

2) Fever (axillary temperature ≥37.8°C)

EXCLUSION CRITERIA

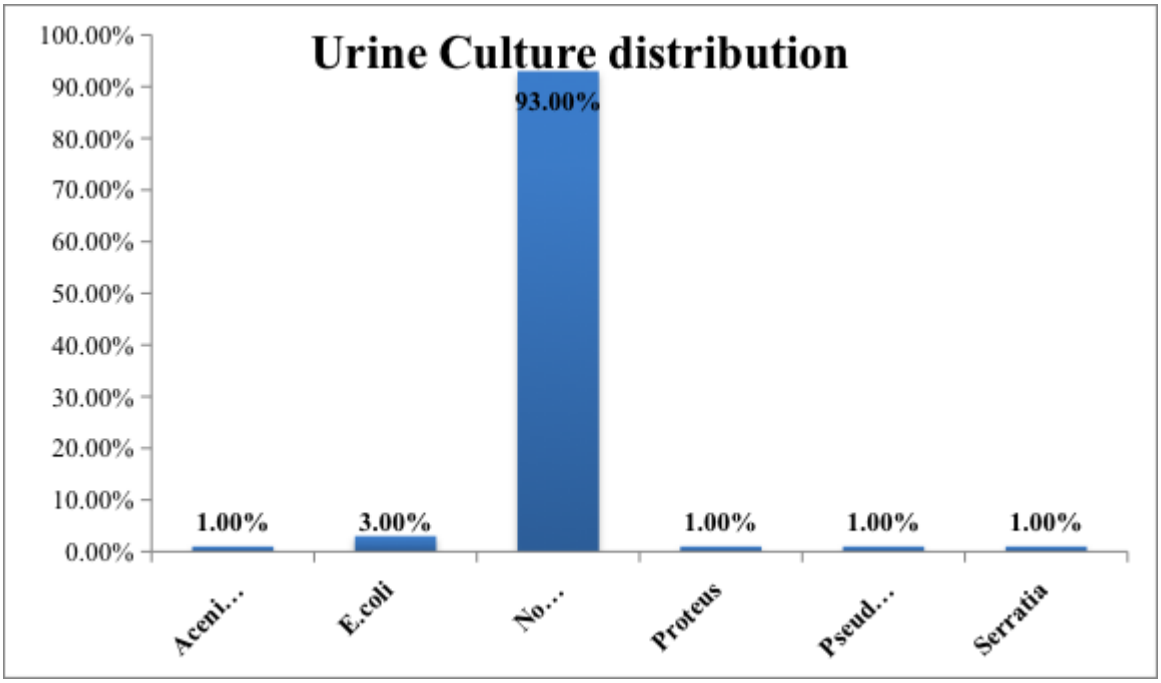
1. Children below 2 years and above 8 years.
2. Any child who has received antibiotics 48 hours prior were not be included in the study.
3. Children with known congenital genitourinary anomalies.

RESULTS

Distribution of bacterial sps in urine culture

Urine Culture distribution	Numbers (n = 100)	Percentage
Acinetobacter Sps.,	1	1.0%
E.coli	3	3.0%

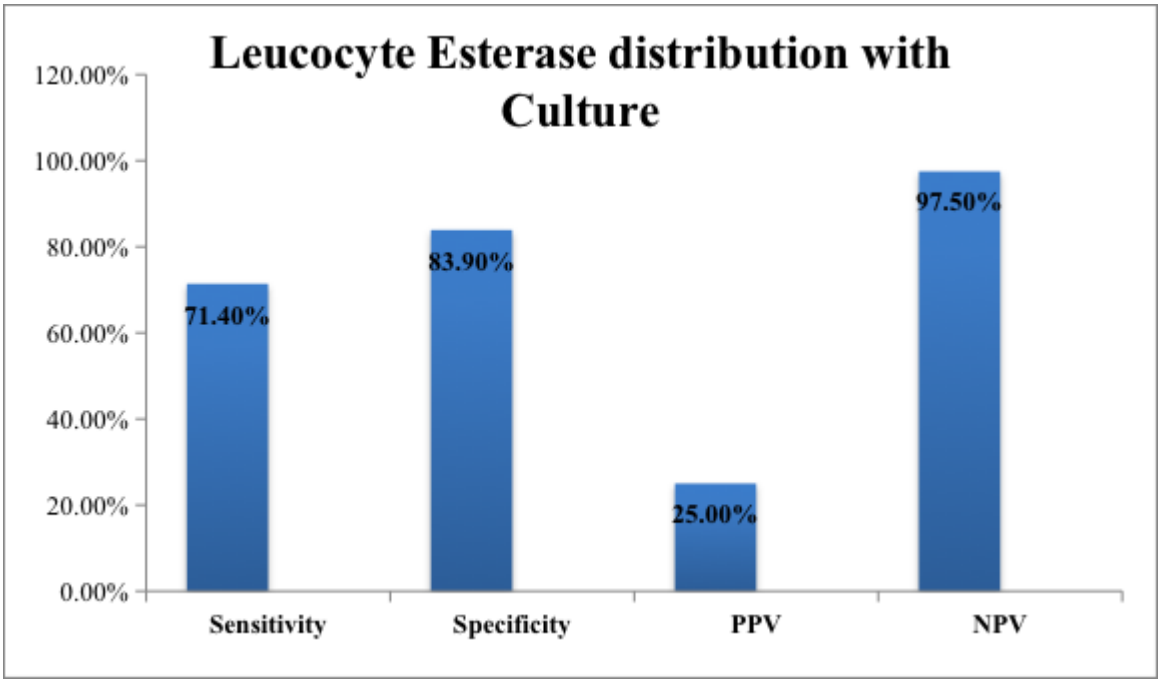
No Growth	93	93.0%
Proteus Sps	1	1.0%
Pseudomonas Sps.,	1	1.0%
Serratia Sps.,	1	1.0%
Total	100	100%



Leucocyte Esterase distribution with Culture

Leucocyte Esterase distribution	**Culture**		**Total**
	Positive	**Negative**	
Positive	5	15	20(20.0%)
Negative	2	78	80(80.0%)
Total	7	93	100 (100%)
Fisher's Exact test		P value	0.003

Sensitivity 71.4%
Specificity 83.9%
Positive Predictive value 25.0%
Negative Predictive value 97.4%



Nitrite distribution with Culture

Nitrite distribution	**Culture**		**Total**
	Positive	**Negative**	
Positive	3	6	9(9.0%)
Negative	4	87	91(91.0%)
Total	7	93	100 (100%)
Fisher's Exact test		P value	0.015

Sensitivity 42.9%
Specificity 93.5%
Positive Predictive Value 33.3%
Negative Predictive Value 95.6%

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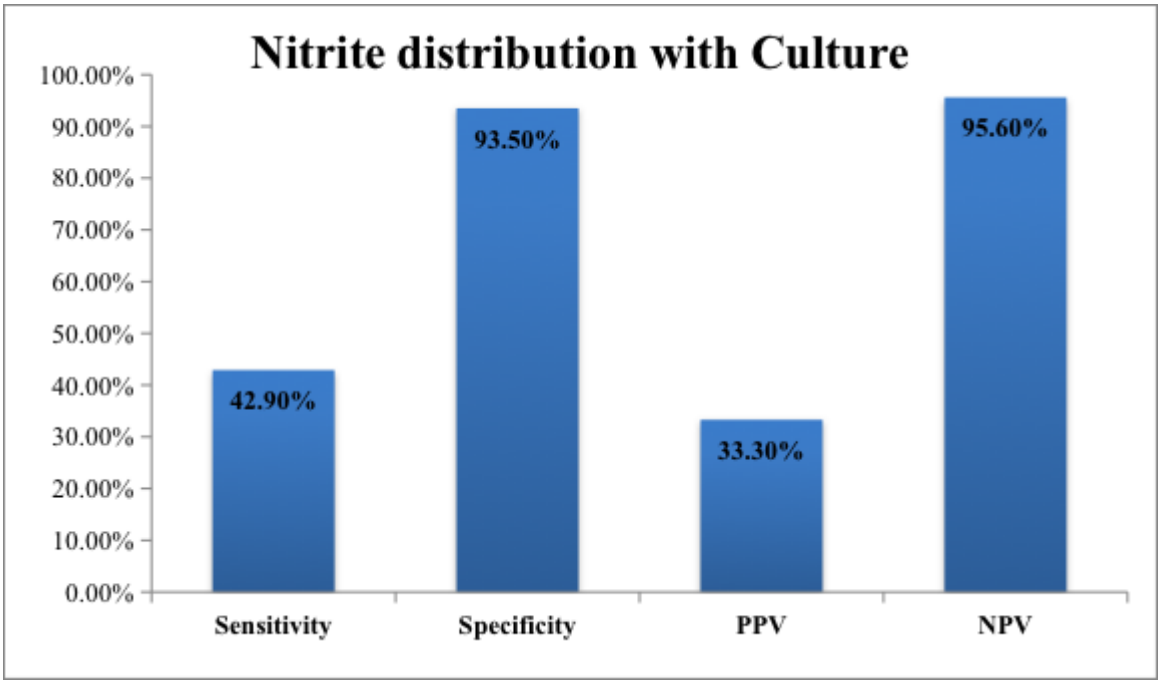

Leucocyte esterase and Nitrite distribution with Culture

L & N distribution	Culture		Total
	Positive	Negative	
Positive	3	4	7(7.0%)
Negative	4	89	93(93.0%)
Total	7	93	100 (100%)
Fisher's Exact test		P value	0.007

Sensitivity 42.9%
Specificity 95.7%
Positive Predictive Value 42.9%
Negative Predictive Value 95.7%

DISCUSSION

UTI is defined by the presence of organisms in the urinary tract, which is usually sterile. Young children with UTI may present with nonspecific symptoms such as poor feeding, vomiting, irritability, or fever alone. Over last few decades, the importance of UTI has been increasingly understood, especially the role of UTI as an occult cause of febrile illness in young children.

Hence, a broader approach to screening may be appropriate. Two previous studies of the prevalence of UTI among children presenting to an emergency department with fever found rates ranging from 3.5% to 5.5%. The epidemiology of UTI during childhood also varies by age, gender, and other factors.

The gold standard for diagnosis of UTI is positive urine culture. If the culture shows >50,000 colonies of a single pathogen (suprapubic or catheter sample), or if there are 10,000 colonies and the child is symptomatic, the child is considered to have a UTI. In a bag sample, if the urinalysis result is positive, the patient is symptomatic, and there is a single organism cultured with a colony count >100,000, there is a presumed UTI. If any of these criteria are not met, confirmation of infection with a catheterized sample is recommended.

CONCLUSION

Urine culture should be a mandatory investigation in febrile children of age with no focus. First UTI in these children should be investigated thoroughly so that long term complications can be prevented by early detection of a correctable structural abnormality and adequate antibiotic prophylaxis. Small sample size, lack of inpatient and outpatient correlation, lack of antibiotic susceptibility testing are the limitations of this study.

Urine culture positivity was more in children showing dipstick leucocyte esterase positive as compared to children showing dipstick nitrite positive and children showing both dipstick leucocyte esterase and nitrite positive. Dipstick leucocyte esterase was highly sensitive in detecting UTI as compared to urine analysis, dipstick nitrite test and both dipstick leucocyte esterase and nitrite test.

Dipstick leucocyte esterase and nitrite test was highly specific and accurate in detecting UTI as compared to dipstick leucocyte esterase, dipstick nitrite test and urine analysis. Dipstick leucocyte esterase and nitrite test showed the highest PPV wherea dipstick leucocyte esterase showed highest NPV. No test can screen accurately for UTI in young children. The urine dipstick plus culture tests appear to be the most cost-effective strategy for screening and beginning presumptive treatment for UTI in febrile young children.

The clinician's major goal for the young child with UTI is early diagnosis in order to eradicate infection in the growing kidney and to allow identification of urinary tract abnormalities before the deterioration of renal function. Early detection and treatment of the first infection in infants may be the only way to reduce the incidence of reflux nephropathy and to prevent renal damage.

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