

# Reliability of the urine analysis for predicting UTI in young febrile children

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## Abstract

**Background:** Urinary tract infection is a common and frequently recurring condition in children. Renal parenchymal scarring, hypertension, and renal insufficiency are well-established complications of the infection in children. To reduce the risk of renal damage, diagnosis and treatment must be immediate. **Aim and objective:** To assess the validity of microscopic urine analysis and urine culture in the diagnosis of urinary tract infection. **Methodology:** Total 160 young febrile children were studied. Data collection was done with pretests questionnaire. Urine analysis was tested against gold standard urine culture. Sensitivity, specificity calculated. **Results:** Sensitivity and Specificity of urine analysis was 87.50% and 84.21%. PPV and NPV was 22.58% and 99.22%. Percentage of false positive and false negative was 15.79% and 12.50% respectively. Accuracy rate was 84.37%.

**Key Words:** UTI, Reliability.

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## INTRODUCTION

Urinary tract infections is the common disease in infants and in the toddlers. UTI recurs easily if it is accompanied with anatomical anomalies of urinary system. If it is not treated adequately or occurs recurrently, UTI may develop in to chronic pyelonephritis. It is essential to identify urinary tract infections in febrile children and institute prompt treatment to reduce the potential for lifelong morbidity. Progressive renal damage from unrecognized pyelonephritis in childhood may lead to hypertension and chronic renal failure in later life, a condition normally seen in 15-20% cases of chronic renal failure.<sup>1</sup> Fever and significant bacteriuria and pyuria in children without any sources of infections must be presumed to

be symptoms of pyelonephritis, an invasive infection of the renal parenchyma requiring prompt treatment. More than 75 percent of children under 5 years of age with febrile UTI have pyelonephritis is stated by recent studies using renal parenchyma and nuclear scans to determine the presence of UTI.<sup>2,3,4</sup> Higher risk of renal scarring is seen in children under 3 years of age with recurrent UTI.<sup>3,5,6,7</sup> Quite often, child receives antibiotics empirically, without adequate evaluation for urinary tract infection. Fever, however, is often the only symptom in children with urinary tract infections.

Due to non specific presentations in children and rampant practice of prescribing antibiotics to all febrile children in our area, diagnosis of UTI is likely to be missed in children and it is well known fact that every single episode of UTI in children especially <5yrs of age should be evaluated further to know the etiological diagnosis and to prevent critical renal damage due to recurrent episode of UTI. Hence there should be high index of suspicion in febrile children without obvious focus in order to pick up children with UTI. It would be helpful to know the diagnostic methods for early and correct diagnosis of UTI.

## MATERIAL AND METHODS

The present study was conducted in the department of Pediatrics, Rajarshee Chhatrapati Shahu Maharaj

Government Medical College and Chhatrapati Pramila Raju Hospital, Kolhapur over a time period of 12 months. The subjects in this study were all O.P.D. and I.P.D. patients who fulfilled the necessary criteria. children with obvious focus of respiratory tract, central nerves system, gastro-intestinal tract and skin and soft tissue ,children < 1 month and >12yrs of age and children whose parents /gaurdians not willing to enroll child in the study were excluded. Study was approved by ethical committee of the hospital. A written valid consent was taken from parents after explaining study to them. About 160 febrile cases without obvious focus of fever in age group of 1 month to 12years were taken for the study. Data collected with pretested questionnaire. Data included detailed history, clinical examination and investigations. Routine blood counts, urine analysis, urine culture and sensitivity was done in them. In children below 2 years of age, urine sample was collected under aseptic precautions by transurethral bladder catheterisation or suprapubic aspiration. Urine was collected around 10 ml into sterile bottle and sent for, urine analysis, culture and sensitivity. In children above 2 years of age, a clean-catch mid-stream specimen was used to minimize contamination by periurethral flora. Contamination was minimized by washing the genitalia with soap and water. Child was allowed to pass urine; midstream sample was collected in sterile bottle and was sent for urine analysis, culture and sensitivity. Presence of more than 5 pus cells /HPF in a centrifuged urine sample was considered as significant pyuria. A positive urine culture was defined as growth of >10<sup>5</sup> colonies of a single urinary tract pathogen/ml of urine specimen. The term validity refers to what extent the test accurately measures which it purports to measure. The term “valid” implies that there is some sort of external standard or “gold standard” against which the current measurement is being compared. Data was tabulated and graphs were derived at appropriate places. Data was analyzed with appropriate statistical tests.

## RESULTS

**Table 1:** Age and Sex Distribution Of 160 Febrile Patients Without Obvious Focus Of Fever

AGE (Years)	SEX		TOTAL (n=160)
	MALE	FEMALE	
<1 year	17(19.32%)	13(18.06%)	30(18.75%)
1 - 3 years	24(27.27%)	19(26.39%)	43(26.88%)
3 - 6 years	22(25.00%)	22(30.56%)	44(27.50%)
6 - 9 years	13(14.77%)	6(8.33%)	19(11.88%)
9 - 12 years	12(13.64%)	12(16.66%)	24(15.00%)
<b>TOTAL</b>	<b>88 (100.00%)</b>	<b>72(100.00%)</b>	<b>160 (100.00%)</b>

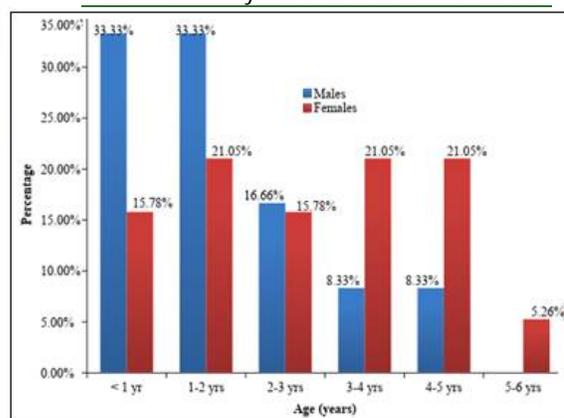
Out of 160 patients in study ,88(55%) were males and 72(45%) were females. 30 cases were < 1year (18.75%), 1-3 years were 43(26.88 %), 3-6 years were 44(27.50 %), 6-9 years were 19(11.88 %) and the remaining i.e. 9-12 years were 24(15.0 %).Maximum cases were seen in age group of 3-6yrs (27.50%). Out of total 160 febrile patients 31(19.37%) children showed significant pyuria in centrifuged urine sample of which 12( 38.70%) were males and 19 (61.29%) were females. Male to female ratio showing significant pyuria was 0.6:1.Majority were<2years, 15 (48.38%). Maximum children were in age group of 1years -2 years, 8 (25.80%) (figure 1) In the present study, Sensitivity and Specificity of urine analysis was 87.50% and 84.21%. PPV and NPV was 22.58% and 99.22%. Percentage of false positive and false negative was 15.79% and 12.50% respectively. Accuracy rate was 84.37%.

**Table 2:** Validity of Urine analysis and culture

TEST Urine analysis	Culture + ve	Culture - ve	TOTAL
Positive	7	24	31
Negative	1	128	129
<b>Total</b>	<b>8</b>	<b>152</b>	<b>160</b>

Pooled data;  $\chi^2 = 1.92$  DF = 2 P = 0.166; p value is Non significant

A.	Sensitivity = a/a+c x 100	87.50 %
B.	Specificity = d/b+d x 100	84.21 %
C.	PPV = a/a+b x 100	22.58 %
D.	NPV = d/c+d x 100	99.22 %
E.	% of FN = c/a+c x100	12.50 %
F.	% of FP = b/b+d x 100	15.79 %
G.	Accuracy = a+d/ a+b+c+d	84.37 %



**Figure 1:** Age And Sex Distribution Of Febrile Children With Urine Showing > 5 Pus Cells /Hpf

## DISCUSSION

In present study ,out of 160 febrile children without any obvious focus 31(19.37%) children showed significant pyuria in centrifuged urine sample of which 12( 38.70%) were males and 19 (61.29%) were females. And among this 31 cases 8(25.80%) showed bacterial

growth on urine culture. In present study overall percentage of UTI was 5% which is similar to study by Quigley R<sup>8</sup> study where prevalence of 7% was noted. Similar results were observed by previous studies<sup>9,10</sup> where prevalence was in the range of 2.1% to 8.7%. In contrast to the present study, one study, Schlager TA<sup>11</sup> reported low prevalence of 1.7%, whereas Rabasa AI and Gofama MM<sup>12</sup> reported high prevalence of 13.7%. In the present study, Sensitivity and Specificity of urine analysis was 87.50% and 84.21%. PPV and NPV was 22.58% and 99.22%. Percentage of false positive and false negative was 15.79% and 12.50% respectively. Accuracy rate was 84.37%. In correlation to present study Shaw KN *et al*<sup>13</sup> stated sensitivity and specificity of 57-87% and 53-79% respectively and in other study by Waisman Y *et al*<sup>14</sup> reported sensitivity and specificity of 97.1% and 82.5% and PPV and NPV of 69.4% and 98.6% respectively, are almost similar to present study.

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