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Original Research Paper

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UTILITY OF URINE DIPSTICK TEST IN EARLY DIAGNOSIS OF UTI IN FEBRILE CHILDREN AGED 2 YEARS TO 5 YEARS IN A TERTARY CARE CENTRE.

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ABSTRACT Urinary tract infection (UTI) is the second most common infectious disease in toddlers, and the most common disease in infants. UTI recurs easily if it is accompanied with anatomical anomalies of the urinary system. Urinalysis was done as early as possible after obtaining urine sample and the same specimen was immediately transported to the department of microbiology for urine culture .In case if delay is inevitable we refrigerated the sample at 40Celsius. Proteinuria, nitrite test and leukocyte esterase were done using Siemens Multistix 10 SG reagent strips. UTI should be considered as a potential cause of fever in children below 5 years of age. As the children in this age group with UTI usually present with nonspecific signs and symptoms, sometimes fever may be the only presentation so urine culture should be considered as a part of diagnostic evaluation.

KEYWORDS :

1. INTRODUCTION

Urinary tract infection (UTI) is the second most common infectious disease in toddlers, and the most common disease in infants. UTI recurs easily if it is accompanied with anatomical anomalies of the urinary system. And, if it is not treated adequately or occurs recurrently, UTI may develop into chronic pyelonephritis, therefore, result in hypertension and loss of renal function, a condition normally seen in 15-20% of the cases of chronic renal failure[1]. The risk of developing UTI before the age of 14 years is approximately 1% in boys and 3-5% in girls. The incidence varies with age. During the first year of life, the male to female ratio is 3-5:1. Beyond 1-2 years, there is female preponderance with male to female ratio of 1:10[2]. In a study by Msaki B P et al[3] (2012) in the NorthWestern Tanzania the prevalence is 20.3% with female under-fives having the highest prevalence (males versus female: 12.4% versus 26.9%, $P < 0.01$). In a study by Morris CM et al[4] (2007) in children less than 3years showed a prevalence rate of 9% in 98 children. UTIs are much more common in uncircumcised boys, especially during 1st year of life[5]. In children, UTI frequency, clinical symptoms, and the causative pathogens, vary according to sex and age. Moreover, because of a wide variety of non-specific and systemic symptoms, it is difficult to perform tests for early diagnosis, and the resultant inaccurate diagnosis may lead to antibiotic abuse. Thus, in many cases, a severe renal injury occurs even before the UTI is diagnosed. For this reason, an early and accurate diagnosis through careful examination and tests can help in preventing severe renal injuries through adequate treatment and careful follow-up.1 Despite of high prevalence of UTI in the age group between 2 to 5 years, unfortunately, little has been published regarding Indian scenario. No previous studies were published in our part of India. We conducted the present study to find out the actual prevalence of UTI, its clinical variation, its etiological profile and to study complete urine examination, urine nitrite and urine leukocyte esterase as compared to urine culture in the children between 2 to 5 years, to aid in its early diagnosis and to prevent its dreaded complications.

MATERIALS AND METHODS MATERIALS:

Source of data: This is a cross sectional observational study in the Department of Pediatrics, in a tertiary hospital, from February 2017 to October 2018. Sample size calculations demonstrated, a sample size of 400 children is needed to estimate the prevalence. Urinalysis was done as early as possible after obtaining urine sample and the same specimen was immediately transported to the department of microbiology for urine culture .In case if delay is inevitable we refrigerated the sample at 40Celsius. Proteinuria, nitrite test and leukocyte esterase were done using Siemens Multistix 10 SG reagent strips. Procedure for testing was strictly followed as per user s manual.

OBSERVATIONS AND RESULTS:

During the study period of two years from February 2017 to October 2018 at tertiary Hospital, Telangana, a total number of 400 febrile children between age of 2 to 5 years who attended pediatric outpatient department and those who admitted in the pediatric ward were studied. Out of these patients, 40 cases were diagnosed to have UTI as judged by the presence of significant bacterial growth in urine culture. The results of this study were analyzed as follows. TABLE 6: PREVALENCE OF CASES Frequency % Culture Positive 40 10% Culture Negative 360 90% Total 400 100% Among 400 children presented with fever 40(10%) were found out to be culture positive.

Table 1: Prevalence Of Case:

	Frequency	%
Culture Positive	40	10%
Culture Negative	360	90%
Total	400	100%

There was a female preponderance in culture positive cases with male to female prevalence ratio of 1:2.05, which was statistically significant.

Prevalence of UTI in febrile preschool school in the age group of 2-5 years was 6.8% in males and 14% in females with overall estimated prevalence of 10%.

Out of 40 cases all were presented with fever(100%), Next to fever, dysuria observed in 18 of 40(45%), vomiting observed in 14 of 40(35%), chills and rigors in 14 of 40(35%), failure to thrive 12 of 40(30%), increased frequency 10 of 40(25%), irritability 10 of 40(25%), all other symptoms to a lesser extent. Four patients who presented with convulsion had normal findings on clinical examination and were finally diagnosed as febrile seizure. Among physical findings ill and toxic appearance observed in 12 out of 40 cases(30%),dehydration 8 out of 40 cases(20%) and other findings to a lesser extent.

In culture positive cases, 35(87.5%) patients had positive result for leucocytes esterase where as in culture negative cases 75(20.8%) patients had positive result which was statistically significant. However, 5(12.5%) culture positive cases would

have been missed if leucocytes esterase was taken as a method of diagnosis of UTI.

Leucocytes esterase test had a sensitivity, specificity, Positive predictive value and negative predictive value of 87.5%, 79.2%, 31.8%, and 98.3% respectively.

In culture positive cases, 21(52.5%) patients had positive result for Nitrite test where as in culture negative cases 8(2.2%) patients had positive result which was statistically significant. However, 19(47.5%) culture positive cases would have been missed if Nitrite test was taken as a method of diagnosis of UTI.

Nitrite test had a sensitivity, specificity, Positive predictive value and negative predictive value of 52.5%, 97.8%, 72.4%, and 94.9% respectively.

In culture positive case of 19 (45 %) patient had positive result of leukocyte esterase and nitrate .where as in culture negative case 15 (4 %) patient had positive for leukocyte esterase and nitrate.

In culture positive cases, 27 (67.5%) patients had bacteria in their urine where as in culture negative cases only 5 (1.4%) patients had bacteriuria which was statistically significant. However, 13 (32.5%) cases with UTI would have been missed if only presence of bacteria on microscopy was taken as a method of diagnosis for UTI

About 37(92.5%) patients with UTI and 44(12.3%) cases without UTI had pus cells>5 per HPF which was statistically significant. This suggests that 44 (12.3%) children without UTI would have been considered as infected if only pyuria was taken as a diagnostic method for UTI. At the same time 3(7.5%) culture positive cases would have been missed if only pyuria was taken as method diagnosing UTI.

The most common organism isolated from patients with UTI was E.coli (80%) followed by klebsiella(15%) and proteus(5%).

Majority of the organisms were resistant to Ampicillin (55%). 75% of microorganisms were sensitive to ceftriaxone. 70% were sensitive to gentamycin, norfloxacin and cephalexin.

In 28 (70%) cases with UTI, ultrasonography was normal. Ultrasonographic features suggestive of acute pyelonephritis were found in 12(30%) cases with UTI.

1. DISCUSSION

The present study was conducted to know the prevalence of urinary tract infections in 400 febrile children in the age group of 2 years to 5 years, who attended and admitted in pediatric department

PREVALENCE OF UTI:

In the present study, out of 400 febrile children 40 children had UTI with a prevalence rate of 10% (Table 6, Graph 1). This prevalence rate is similar to many studies conducted all over the world. The prevalence ranges from 1.7% to 37.5%.[3,4,8,9,10,11,12,13,14,15,16] This wide range of prevalence may be due to different sample sizes and different ages of study population. Our study results (10%) are in concordance with Morris CM et al (9%)[4], Lo DS et al (11.3%)[11], Ibeneme et al (11%) [13] and Sravanan et al (10.9%).[16]

S. NO	AUTHOR	AGE OF POPULATION	NO. OF CHILDREN STUDIED	PREVALENCE
1	Msaki BP et al(3)	Under five	231	20.3%
2	Bauchner*et al(9)*	Under five	664	1.7%
3	Ibeneme et al(13)	Under five	200	11%
4	Sravanan S et al(16)	1 month to 5 yrs	630	10.9%
5	Present study	2 years to 5 years	400	10%

In the present study the prevalence was 10%, which was similar to studies done by Ibeneme et al (13) and Sravanan S et al(16) showed a prevalence of 11% and 10.9% respectively. Howe ever, Msaki BP et al(3) showed a prevalence of 20.3% higher than our study and Bauchner et al(9) showed a prevalence of 1.7% lower than our study.

SYMPTOMS IN CULTURE POSITIVE CASES:

In the present study there was no consistent symptoms common to all patients with UTI other than fever. However, the dysuria and vomiting were the predominant symptoms. Other nonspecific symptoms like failure to thrive, irritability and refusal of feeds were also noted. In our study frequencies noted were,fever(100%), Next to fever, dysuria(45%) , vomiting(35%), chills and rigors(35%), failure to thrive(30%), increased frequency(25%), irritability(25%), abdominal pain(20%), loss of appetite(20%) and all other symptoms to a lesser extent. Four patients who presented with convulsion had normal findings on clinical examination and were finally diagnosed as febrile seizure. Among physical findings ill and toxic appearance observed in 12 out of 40 cases(30%), dehydration 8 out of 40 cases(20%) and other findings to a lesser extent.

Similar to our study, In a study by Anis-ur-Rehman et al(2008) in children between 0 to 15years fever was observed in 91% cases, but Dysuria (65%) and failure to thrive (40%)(15) were more than that of our study. This difference might be because of difference in age group under study. In another study by Sharma A et al(2011)(42) in children attending Nepal Medical College showed fever was the most common presentation (65.0%) less than that of our study, abdominal pain (42.5%) and decreased appetite (37.5%) more than our study and dysuria (37.5%) less than our study.

URINALYSIS:

LEUCOCYTE ESTERASE TEST:

In the present study leukocyte esterase test had a sensitivity, specificity, Positive predictive value and negative predictive value of 87.5%, 79.2%, 31.8%, and 98.3% respectively.

The present study shows sensitivity(87.5%) of leukocyte esterase in detecting UTI was more than specificity(79.2%).It was similar to the study done by Taneja N et al(2010)(55) and Laosu-angkoon S et al(56) who showed a specificity of 58.5%, 44.2% and sensitivity of 73.5%, 58.5% respectively. However a study done by Velasco R et al showed specificity (92.4%) more than sensitivity (82.1%)

In the present study PPV and NPV of leukocyte esterase were 31.8% and 98.3% respectively. This was similar to study done by Taneja N et al (55) who showed PPV and NPV of 33% and 88.8% respectively.

The present study (Table 13, Graph 8) showed the specificity (97.8%) of nitrite test in detecting UTI was comparable to studies done by Taneja N et al(55) and Mava Y et al(58) who showed specificity of 78.7% and 93.5% respectively. Similarly sensitivity(52.5%) of present study was comparable with Taneja N et al[55](57.1%) and Mava Y et al[58](66.2%). However Hoberman et al(54) reported very low sensitivity(31.4%).

The present study showed the specificity(95.8%) of nitrite test and leukocyte esterase in detecting UTI was comparable to studies done by fernandes DJ et al(77) and nayak US et al

who showed specificity of 96.97% and 25% respectively. Similarly sensitivity(45%) of present study was comparable with fernandes DJ et al(31.5%) and nayak US et al(68%).

The NPV of present study was 94% it was NOT concordance with fernades DJ et al[18] and nayak US et al who showed NPV of 71.11% and 22% respectively. The PPV of present study was 54.5% it was not similar to that of fernandes DJ et al(85.7%). However nayak US et al[19] et al reported a PPV(71.4%).

1. CONCLUSION

UTI should be considered as a potential cause of fever in children below 5 years of age. As the children in this age group with UTI usually present with nonspecific signs and symptoms, sometimes fever may be the only presentation so urine culture should be considered as a part of diagnostic evaluation.

High yield was obtained in patients with fever with no apparent source. There is a significant association of female sex with UTI. Hence urine culture should be done routinely in such patients. Most common etiological agents identified in this age group were gram negative bacteria.

The sensitivity, specificity and predictive values of isolated proteinuria, leukocyte esterase, nitrite test, pyuria, and bacteriuria are poor compared to urine culture. The positive result neither detect all patients with UTI nor the negative test completely rules out infection.

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