A Study of The Prevalence of Urinary Tract Infection in Infants And Children Presenting with Diarrhea

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Abstract
Background: Urinary tract infection (UTI) is the second most common bacterial infection in infants and children with a peak for infants especially in toilet training period. A prevalence of 3% - 7% is reported in children younger than two years, while it is presenting in emergency departments (ED) with a febrile illness. Since it is difficult to diagnose UTI in young children many cases are probably missed. Along with all the mentioned symptoms, another common symptom for many diseases in infants and children is diarrhea. Diarrhea as a symptom is likely to be presented in UTI. Since in developing countries diarrhea is rampant, demonstration of an association between UTI and diarrhea will be of clinical significance.
Objective: Primary objective of this study is to know the prevalence of Urinary tract infections in infants and children presenting with diarrhea.
Methods: Study includes 100 children presenting with diarrhea in the age group of 4 weeks to 5 years after excluding congenital anomalies of Genitourinary and Gastrointestinal tracts. Complete urine examination, urine culture sensitivity, stool examination and ultrasound abdomen were done.
Results: The overall prevalence of UTI in children presenting primarily with diarrhea was 8%. The prevalence of UTI in girls presenting with diarrhea was 14.2% in contrast to only 1.9% in boys.
Conclusion: Diarrhea is one of the common manifestations and risk factors of UTI in children.
Keywords: children, dehydration, diarrhea, urinary tract infection.

I. Introduction

Urinary tract infection (UTI) is a common bacterial infection in infants and children with a prevalence of 3% - 7% is reported in children younger than two years [1]. Seven percent of females and two percent of males who are symptomatic of UTI have positive culture up to the age of six years. The incidence of UTIs depends on age and sex. In the first year of life, UTIs are more common in boys (3.7%) than in girls (2%). This is even more pronounced in febrile infants in the first 2 mo of life, with an incidence of 5% in girls and 20.3% in uncircumcised boys, as demonstrated in one prospective study of >1000 patients using urine specimens obtained by catheterisation [2]. Later, the incidence changes, and about 3% of prepubertal girls and 1% of prepubertal boys are diagnosed with a UTI. Urinary complaints are rare and only after 5 years of age, the typical triad of abdominal pain, vomiting and fever with chills, rigors or suprapubic pain are common presentations of upper and lower UTI. It is often over looked especially in infants and young children in whom the symptoms are vague and don't focus the attention on urinary system.

Since it is difficult to diagnose UTI in young children many cases are probably be missed. The challenge is that young children with UTI often present nonspecific symptoms and do not usually pertain to the genitourinary tract that is also present in nonspecific illness. Clinicians may therefore not consider a urine sample in diagnosis. Escherichia coli cause 75% to 90% of UTI infections and morbidities due to relevant infection; therefore, it is necessary to pay more attention in primary care to children [3]. Along with all the mentioned symptoms, another common symptom for many diseases in infants and children is diarrhea. Diarrhea as a symptom is likely to be presented in UTI. In case of pyelonephritis, the clinical findings may include varied gastrointestinal symptoms such as diarrhea, vomiting and nausea which may confound the diagnosis of UTI. UTI in children needs more attention because of the acute and chronic complications of it in children. The majority of these infections in the first 2 years of life are "occult" and that most infection remain undiagnosed if tests are not routinely performed to detect them. Otherwise unexplained renal scarring is one of the common

causes of end-stage renal disease (ESRD) and is an established risk factor for subsequent hypertension. Thus the high incidence of undiagnosed, untreated UTI in young children is cause for clinical concern. Up to 50% of the long term sequelae of UTI in infants and young children are preventable by urine testing [4]. Although microscopic urinalysis for leukocytes and bacteria is often used as a diagnostic tests for UTI, the sensitivity, specificity and predictive values of these tests have varied greatly according to the patient population studied, the definition of a positive culture result and the method of urinalysis.

Diarrhea is common in infants and children, and urinary tract infection (UTI) is the second most common bacterial infection. Since in developing countries diarrhea is rampant, demonstration of an association between UTI and diarrhea will be of clinical significance. Diarrhea may be the presenting symptom in younger children with UTI as it is common manifestation of UTI in this period therefore we planned to evaluate if this can be used as a high risk index to pick up cases of UTI. There have been a limited number of studies on the correlation between UTI and acute diarrhea [5][6], and it is still not clear when to investigate for UTI in young children presenting with diarrhea Therefore, this study aimed to evaluate the relationship between diarrhea and UTI.

I.   Aims & Objectives

Primary objective of this study is to know the prevalence of urinary tract infection in children presenting with diarrhea and to identify the clinical correlates which may help to identify children with UTI.

II.   Methodology

The data is collected from parents/guardians of children of age group 4 weeks to 5 years coming to Pediatric OP and admitted in Pediatric wards of Gandhi Hospital with diarrhea, after taking written consent from parents/guardians. It is a prospective observational study and is conducted over a period of 9 months from January 2017 to September 2017, after approval of institutional ethical committee. The study included 100 children. Infants >4weeks of age and children < 5 years of age presenting with diarrhea were included in the study. Children with congenital anomalies of gastrointestinal and genitourinary tracts and children who received antibiotics 48 hrs prior to admission and those children with diarrhea lasting for more than 2 weeks were excluded. Clean catch mid-stream sample of urine and stool samples were collected from these children and complete urine examination and stool examination were done. Four patients who were picked up to have UTI on screening and reported for follow up later were subjected to ultrasound examination of the kidney, ureter and bladder and MCU. Statistical analysis of the data obtained was performed using Chi-square and Fischer exact tests and 0.05 as the level of significance.

III. Results

During the 9 months study period at Gandhi hospital, Secunderabad, Telangana, a total number of 100 children between age of 1month to 5 years presented with diarrhea to pediatric department were studied. Out of these patients, 8 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.

Total number of diarrhea cases studied for UTI: 100
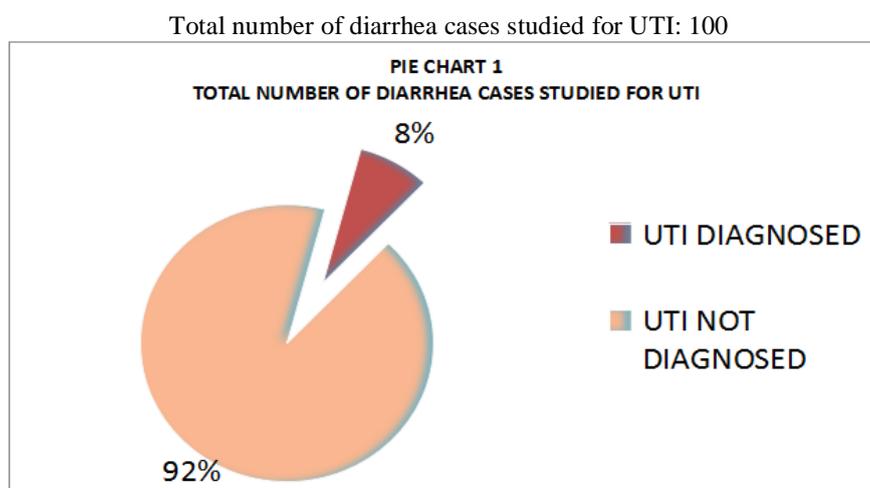
Figure No. 1

Out of 100 cases 8 cases were diagnosed with UTI i.e., Eight (8%) in the study group had pathogenic organisms grown in urine culture.
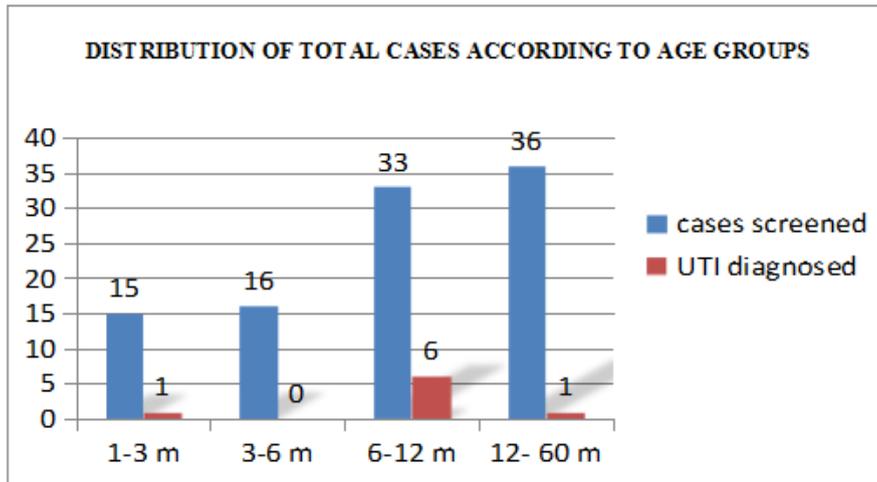
Figure No. 2

Out of 15 cases of 1-3 months old only 1(6.6%) case was diagnosed with UTI

Out of 16 cases of 3-6 months old no (0%) cases were diagnosed with UTI

Out of 33 cases of 6-12 months old 6 (18.1%) cases were diagnosed with UTI

Out of 36 cases 1 (2.7%) case was diagnosed with UTI (*p value 0.059*)
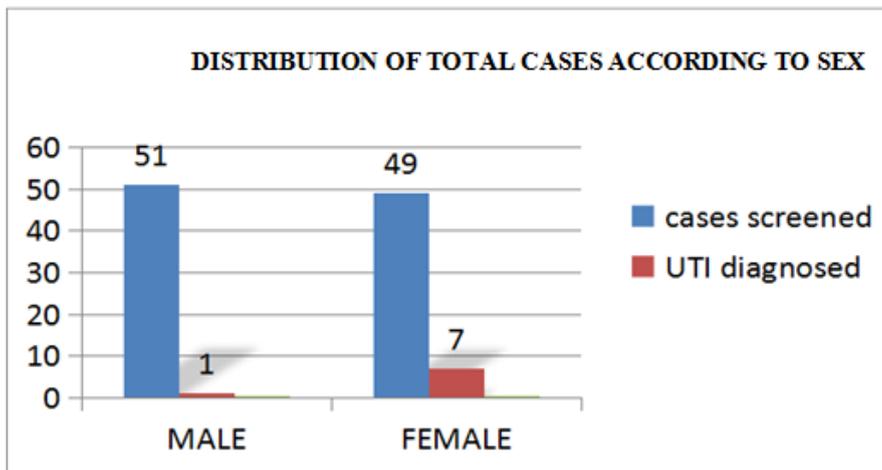
Figure No. 3

Out of 51 males, 1 (1.9%) and out of 49 females, 7(14.2%) were diagnosed with UTI (*p value: 0.026*)
The prevalence of UTI in girls presenting with diarrhea was 14.2% in contrast to only 1.9% in boys.
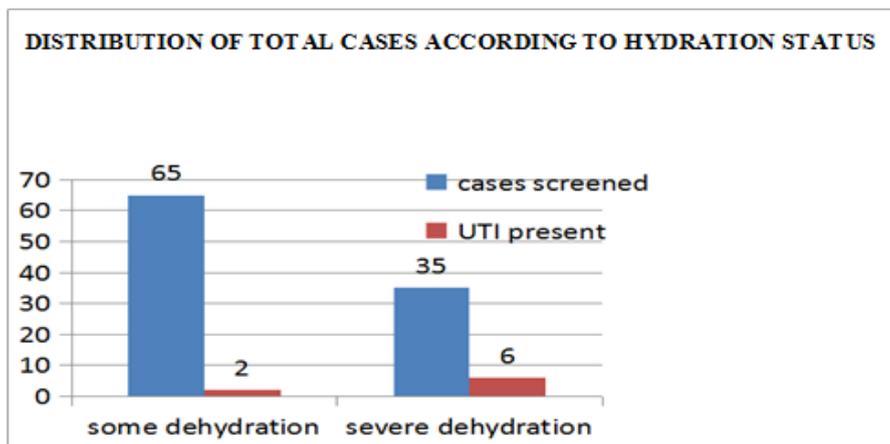
Figure No. 4

Out of 65 cases with some dehydration, 2 (3%) cases were diagnosed with UTI
Out of 35 cases with severe dehydration, 6 (17.3%) cases were diagnosed with UTI
UTI was appreciably higher (17.1%) in the cases that were severely dehydrated as compared to those with some dehydration (3%). There was a significant association between UTI and the hydration status of the cases (p value 0.02).

Table 1: Organisms

Organisms	Total No. of cases	Percentage
E.Coli	5	62.5
Klebsiella	2	25
Candida	1	12.5
Total	8	100

Grown In Positive Urine Culture of Diarrhea Cases

The most common organism isolated from urine culture of diarrhea patients was E.Coli followed by Klebsiella as shown in TABLE 1. The same patients stool sample was also sent for culture. In only three cases we could isolate the same organism both from urine and stool, organisms being different in other cases. Isolation of different organisms from stool and urine cultures in five cases out of eight indicates that at least in these cases the urinary infection was not an ascending one. It seems these were primarily cases of UTI, diarrhea being a manifestation, the so called parenteral diarrhea. In absence of serotyping it is difficult to comment on the causal relationship even the cases in which the same species of organism was isolated from both stool and urine.

IV. Discussion

Urinary tract infection is a common problem in the pediatric age group and is a significant risk factor for long term sequelae. The clinical signs and symptoms of UTI are non-specific in infants and vague in the first 5 years of age and do not usually pertain to the genitourinary tract. Diarrhea is a common manifestation of UTI in this period. Diarrhea is common in infants and children, and urinary tract infection (UTI) is the second most common bacterial infection. Diarrhoea may be the presenting symptom in younger children with UTI. Since in developing countries diarrhoea is rampant, demonstration of an association between UTI and diarrhea will be of clinical significance. The present study was undertaken to estimate the prevalence of UTI in children with diarrhea and to identify the clinical correlates which may help to identify children with UTI. Out of the 100 cases included in the study, the overall prevalence of UTI in children presenting primarily with diarrhea was 8% which compares favorably with the reported prevalence rate of many studies conducted all over the world. The overall prevalence varies from 5%-23%. Most common age group were 6-12 months of age though statistically not significant the same age group were the most common age group affected in most of the previous studies.

Of the 100 children with diarrhea, 51 were boys and 49 were girls. Eight (8%) in the study group had pathogenic organisms grown in urine culture. Seven out of the 8 cases were girls and six of them were between 6-12 months of age.most of the previous studies showed the same results in gender and age distribution except some. In a study by Umesh et al., (2016) [7], among the 458 children, 75 (16.37%) were found to be culture positive. Most common age group having culture positivity was 6-10 years (29.33%) and it showed that UTI is more common in boys (54.66%) than in girls (45.33%). In the present study the prevalence of UTI in girls presenting with diarrhea was 14.2% in contrast to only 1.9% in boys with a p value of 0.026 which is statistically significant.

UTI is usually caused by Gram negative organisms from the gut by ascending infection. The higher proportion of cases of UTI in children with greater degree of dehydration may be due to oliguria and poor mechanical flushing of the urethra [6]. Heavy periurethral colonization often associated with perineal contamination following diarrhea will explain the high degree of prevalence in these patients. In the present study 65 cases were some dehydrated in them 2 (3%) cases diagnosed with UTI, 35 cases were severely dehydrated in them 6 (17.3%) cases diagnosed with UTI with p value of 0.02 which is statistically significant.

Significant pyuria is defined as >10 leukocytes per mm^3 in a fresh uncentrifuged sample, or >5 leukocytes per high power field (HPF) in a centrifuged sample [8]. A study by Taneja N et al.,(2010) [9] showed sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and the diagnostic odds ratio (DOR) of microscopic significant pyuria detection were 68.4%, 60.8%, 32.7%, 87.3%, and 3.4 respectively. A study done by Laosu-angkoon S et al., (2013) [10] showed pyuria can be used to detect UTI instead of urine culture due to its significant incidence. The presence of pyuria had a specificity of 60.9% and a sensitivity of 95.6% for positive urine culture compared to the dipstick test.

Symptoms of UTI in young children tend to be nonspecific. If UTI is not suspected or there is difficulty obtaining a sample, the diagnosis will be missed. O'Brien et al., (2013) [11] proved that the prevalence of UTI was two in one-hundred in children older than three years without increased urinary frequency or dysuria. Urine

sampling based purely on suspicion would be useful particularly in primary care where children frequently consult with non-specific symptoms and where appropriate pediatric equipment is not always available.

Ashok et al., (2013) [12] conducted a comprehensive study on clinical profile of children with UTI aged from three to six years and found that 14 (70%) cases had a diagnosis other than UTI such as diarrhea and respiratory infection. Of the 80 cases with diarrhea 4 (5%) patients had UTI. UTI would be missed if urine culture was not taken as a routine diagnostic method of evaluation. The current study findings also revealed that most of the participants with positive urine culture were in the age group ranged from 6months to 1 year.

V. Conclusion

Urinary tract infection is one of the common etiological causes of fever in children, which presents with a wide variety of symptoms of which diarrhea is one of the common manifestations of UTI. In children presenting with diarrhea "female sex, fever, severe dehydration, severe malnutrition and invasive stools" are significant risk factors for UTI. The presence of significant pyuria in microscopic examination of urine can be used as a useful screening tool before sending a sample for urine culture whenever a constraint of resources exists. Hence children presenting with diarrhea with these risk factors should be screened for UTI to facilitate early diagnosis and prompt treatment and reduce morbidity and mortality.

References

[1]. Bensman A, Tim Ulinsk D. Urinary tract infection. 6 ed. USA: Springer; 2009. pp. 1299–311.
[2]. Zorc JJ, Levine DA, Platt SL, et al. Clinical and demographic factors associated with urinary tract infection in young febrile infants.Pediatrics 2005; 116:644–8.
[3]. Dairiki Shortliffe LM. Urinary tract infections in infants and children.8 ed. 1.Philadelphia: WB Saunders; 2002. pp. 1846–84.
[4]. Kramer MS, Tange SM, Drummond KN, Mills EL. Urinary testing in young febrile children : A risk benefit analysis. J Pediatr 1994; 125:6-13.
[5]. Pryles CV, Luders D. The bacteriology of the urine in infants and children with gastroenteritis. Pediatrics, 1961, 28:877–84.
[6]. Thakar R, Rath B, Prakash SK, Mittal SK, Talukdar B. Urinary tract infection in infants and young children with diarrhea. Indian Pediatr. 2000; 37(8):886–9. [PubMed: 10951638].
[7]. Umesh, Padmavati Bisht and Sushma Tamta. 2016. Microbiological Profile in Urinary Tract Infections among Children in a Tertiary Care Center in Kumaun region, India.Int.J.Curr.Microbiol.App.Sci.5 (4):101-108.
[8]. Dr M Vijayakumar,Revised Statement on Management of Urinary Tract Infections INDIAN SOCIETY OF PEDIATRIC NEPHROLOGY Department of Pediatric Nephrology, Mehta Children's Hospitals, Chennai 600 031, India . doctormvk@gmail.com published Indian pediatrics vol 48 sep 17 2011.
[9]. Taneja N, Chatterjee SS, Singh M, Singh S, Sharma M. Pediatric urinary tract infections in a tertiary care center from north India.Indian J Med Res. 2010 Jan; 131:101-5.
[10]. Laosu-angkoon S. The sensitivity and specificity of a urine leukocyte esterase dipstick test for the diagnosis of urinary tract infection in the outpatient clinic of Rajavithi Hospital. J Med Assoc Thai. 2013 Jul;96(7):849-53. PubMed PMID: 24319857.
[11]. O'Brien K, Edwards A, Hood K, Butler CC. Prevalence of urinary tract infection in acutely unwell children in general practice:a prospective study with systematic urine sampling. Br J GenPract. 2013;63(607):e156–64. doi:10.3399/bjgp13X663127. [PubMed: 23561695].
[12]. Ashok C, Kumar GV, Viswanathakumar HM. Study of the prevalence and clinical profile of urinary tract infection in febrile children aged 3 - 6 years who attended pediatric outpatient department in a tertiary care hospital. Int J Health Sci Res (IJHSR). 2013; 3(2):1–5.