

## Original Research Article

# Urinary tract infection in children presenting with diarrhea

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### ABSTRACT

**Background:** Urinary tract infection (UTI) are the 3<sup>rd</sup> most common bacterial infection in infants and young children in developing countries after those of respiratory and gastrointestinal tract infection. Because of nonspecific signs and vague symptoms in very young children, they may remain unrecognized. Rapid evaluation and treatment of UTI is important to prevent renal parenchymal damage and renal scarring that can cause hypertension and progressive renal damage. Since gastroenteritis is rampant in developing countries demonstration of an association between UTI and diarrhea will be of clinical significance. The objective of this study was to estimate the prevalence of UTI in children presenting with diarrhea and to identify the clinical co-relates which may guide to identify children with UTI.

**Methods:** This was a descriptive observational study done in 120 children meeting the inclusion and exclusion criteria, who were admitted in the paediatric ward in father Muller medical college hospital for a period of 1 and a half years. After obtaining an informed consent, a detailed clinical examination was performed on children meeting the inclusion criteria and the data was entered to the preformatted sheet. Urine samples were obtained from all the patients by clean catch mid-stream urine sample, following which urine culture was done for all the children.

**Results:** In the present study, out of 120 children presenting with Diarrhea 17% had UTI. *E. coli* (15 cases) was the most common organism isolated in urine culture followed by *Enterococcus*. Out of 20 UTI cases, 15 were in the age group of 6 months to 1 year followed by 4 cases among 1-3-year age group. 18 out of 20 UTI cases were females. Male:female ratio of UTI patients was 1:9.

**Conclusions:** UTI in young children can present with diarrhea and other nonspecific symptoms. Children presenting with diarrhea need to have a urine analysis and urine culture for the confirmation of UTI, so that long term complications like renal parenchymal damage and hypertension can be prevented.

**Keywords:** Urinary tract infection, Diarrhea, Urine culture

### INTRODUCTION

Acute diarrhea is common in infants and children and is the second most common bacterial infection. Diagnostic algorithms classify diarrhea as either infectious or non-infectious. Infectious diarrhea is caused by direct infection of the gastrointestinal tract by microorganisms. Very little consideration is usually given to diarrhea in patients with infectious diseases that do not primarily affect the gastrointestinal tract but are systemic or affect other organ systems.<sup>1</sup>

Urinary tract infection (UTI) is the third most common bacterial infection in infants and young children in developing countries after those of respiratory and gastrointestinal tract infection. Because of nonspecific signs and vague symptoms in very young children, they may remain unrecognized, and therefore precise data on incidence and prevalence of UTI is not available. The commonest age for occurrence of first urinary tract infection is first year of life in both sexes but particularly in boys which mainly affect the upper urinary tract. Rapid evaluation and treatment of urinary tract infection is important to prevent renal parenchymal damage and renal

scarring that can cause hypertension and progressive renal damage.<sup>2</sup>

Since gastroenteritis (GE) is rampant in developing countries demonstration of an association between UTI and GE will be of clinical significance.<sup>3</sup> According to several studies conducted in India, the overall prevalence of UTI in children presenting primarily with diarrhea is 8%<sup>4</sup>. There have been a limited number of studies on the correlation between UTI and GE and still it is not clear when to investigate for UTI in young children presenting with GE. Therefore, this study is aimed to answer this question.

## METHODS

This descriptive hospital-based study was conducted in the department of paediatrics, father Muller medical college hospital, Mangalore. In the study period 120 diarrhea cases admitted to the paediatric ward were included. children who satisfied the inclusion criteria (Children aged 6 months to 6 years admitted with diarrhea) with proper consent from parents or primary care givers were included in the study. Exclusion criteria include Children who had congenital anomalies of genitourinary tract and the spine those who had received antibiotics within 48 hours prior to admission.

After obtaining an informed consent, a detailed clinical examination was performed and entered to the preformatted data sheet. Urine samples were obtained from all the patients by clean catch mid-stream urine sample. The following definition, terms and diagnostic criteria were used in accordance with specifications given in standard text books.

UTI-Growth of a single bacterial isolate  $>10^5$  colony forming units.<sup>2</sup>

Positive urine culture-A positive urine culture was defined as growth of  $>10^5$  colonies of a single urinary tract pathogen/ml of the specimen in a mid-stream of urine.<sup>2</sup>

All the data were recorded in a predesigned data collection form. The data was checked for completion, consistency and accuracy. Data was analyzed using SPSS software version 24.0.

## RESULTS

A total of 120 diarrhea cases admitted to the paediatric ward were included for the study. In our study 17% of study population were found to have urinary tract infection (Table 1).

The most common organism isolated from the urine is *E coli* (15 cases) followed by *Enterococci* (n=2). Others were *Klebsiella*, *Citrobacter* and *Alpha streptococci* (Table 2).

In the present study group 15 (23%) of urinary tract infection cases were in the age group of 6 months to 1 year, followed by 12% in 3-6 years, together they constitute 35% overall (Table 3).

Out of total 20 cases of urinary tract infection, 18 cases were females and 2 were males. Among 46 girls studied in our study population 18 were noted to have urinary tract infection which was statistically significant (Table 4).

Among the 20 positive urinary tract infection cases 11 children had normal nutritional status whereas rest 9 cases had grade 1 PEM according to Indian Academy of paediatrics classification. Even though 19.5% of malnourished children had urinary tract infection, the data was not statistically significant (Table 5).

In 20 children with urinary tract infection, 12 were normally hydrated. Seven showed some signs of dehydration. Association between some dehydration and urinary tract infection was statistically significant (p value of=0.00757) (Table 6).

**Table 1: Occurrence of UTI in children with diarrhoea.**

Urine culture	Frequency	Percent (%)
<b>Positive</b>	20	17
<b>Negative</b>	100	83
<b>Total</b>	120	120

**Table 2: Causative organisms of UTI.**

Organisms	Frequency
<i>E coli</i>	15
<i>Klebsiella</i>	1
<i>Enterococcus</i>	2
<i>Alpha streptococci</i>	1
<i>Citrobacter</i>	1
<b>Total</b>	20

**Table 3: Association of age with UTI in study group.**

Age group (Years)	Urine culture results		
	Positive	Negative	Total
<b>6m-1</b>	15	28	43
<b>1-3</b>	4	45	49
<b>3-6</b>	1	27	28
<b>Total</b>	20	100	120

**Table 4: Association of gender with UTI in the study group.**

Sex	Urine culture results		
	Positive	Negative	Total
<b>Male</b>	2	72	74
<b>Female</b>	18	28	46
<b>Total</b>	20	100	120

**Table 5: Association of nutritional status with UTI in the study group.**

Anthropometry	Urine culture results		
	Positive	Negative	Total
Normal	11	63	74
Grade 1	9	31	40
Grade 2	0	4	4
Grade 3	0	2	2
Total	20	100	120

**Table 6: Association of dehydration status with UTI in the study group.**

Dehydration	Urine culture results		
	Positive	Negative	Total
No	12	85	97
Some	7	9	16
Severe	1	6	7
Total	20	100	120

## DISCUSSION

The spectrum of illness extends from minor symptoms to life threatening systemic illness. The overall occurrence of UTI in children presenting with diarrhea in the present study was 17%. None of these cases of UTI had symptoms pertaining to the urinary tract. The younger the child, the more diverse are the manifestations of UTI.

Definite cause for association between UTI and acute diarrhea is not known diarrhea could be the result of infection of urinary tract similar to parenteral diarrhea seen with other infections or could be the cause of infection of urinary tract by ascending infection.

We observed 17% prevalence of UTI while in studies done by Thakar et al, Balat et al, Srivaths et al, Narayanappa et al, Fallahzadeh et al, Bagga et al, Jeena et al and Dharindhar et al, it ranged from 7% to 24%.<sup>3-10</sup>

The most common age group in which UTI was observed in the present study is 6 to 12 months (n=15) followed by 1 to 3 years (n=4). These two combined together constitute (n=19) 95% of the total UTI cases (n=20). Other studies also show similar observations. The most common age group in Thakar et al study was 6 to 12 months (75%) followed by 12 to 24 months (12.5%) which together constituted for 87.5%.<sup>3</sup> This shows that younger the age group, more the nonspecific symptoms of UTI.

The most common organism responsible for UTI in the present study was *E coli* (n=15) followed by *Enterococcus* (n=2) this was in concordance with Uppal et al and Srivaths et al, Thakar et al study.<sup>3,5,11</sup>

In our study male to female ratio of UTI in diarrhea was 1:9 (M:F), which was very much higher compared to all

other studies. Thakar et al reported 1:2, Dharnidhar et al and Pryles et al found only females had UTI in their studies.<sup>3,10,12</sup> The possibility of high chances of UTI in diarrhea in females is because of the anatomy where urethra is very close to anal opening and the practice of wiping back to front while cleaning predisposing female children more prone for UTI, where the infecting organisms can gain easy access.

Out of 20 UTI cases only 2 cases had >10 pus cells/HPF on stool microscopy in the present study. There was no significant association between stool pus cells and UTI (p>0.05). In Thakar et al study, invasive diarrhea was found to be an important correlate with UTI.<sup>3</sup>

Studies by Narayanappa et al, Thakar et al, Pryles et al, also accounted stool culture along with the urine culture to isolate the organism responsible for the infection.<sup>6,3,12</sup> And all of them had isolated similar organisms in both urine and stool samples. But none of them had done serotyping so it was difficult to comment about the causal relationship. Our study did not account for stool culture in any of the cases.

Following birth, heavy periurethral colonization with aerobic bacteria normally becomes established in both sexes. Colonization with *E. coli* and *Enterococci* diminishes during the first year and normally becomes light after five years of age. Studies done by Stamey et al suggest that ascending route of infection of the urinary tract is preceded by and associated with heavy colonisation of the periurethral area and the lower urethra with *E coli*. Gastroenteritis may contribute to the colonisation of periurethral flora and increase the risk of developing UTI.<sup>13</sup>

In our study 19.5% of malnourished children had UTI, the data was not statistically significant. There was a statistically significant association between UTI and malnutrition in the studies done by Jeena et al, Thakar et al and Bagga et al.<sup>3,8,9</sup>

In the study of Thakar et al it was noted that 35 cases out of 100 had dehydration among which 6 cases were found to have UTI constituting of about 17%.<sup>3</sup> Similarly in our study among 120 participants 28 had dehydration. Out of these 28 cases 8 children had UTI. This was about 28% among dehydrated children, and this data was statistically significant. Indicating that children presenting as diarrhea with dehydration it is wise to screen them for associated urinary tract infection.

Thus, there was significant association between UTI and age, sex, nutritional status, dehydration in the present study.

The present study shows that signs and symptoms of UTI in infants and young children are nonspecific and usually do not pertain to the genito-urinary tract. Since UTI in infancy and childhood can interfere with kidney function

and growth, it should be detected early and treated as early as possible.

Since diarrhea is one of the manifestations of UTI in less than 3 years old and also gastroenteritis may contribute to colonisation of periurethral region and cause ascending infection, it is desirable to have high index of suspicion of UTI and screen all the children presenting with acute diarrhea

## CONCLUSION

UTI in young children can present with diarrhea and other nonspecific symptoms. Children presenting with diarrhea need to have a urine analysis and urine culture for the confirmation of UTI, so that long term complications like renal parenchymal damage and hypertension can be prevented

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