

A Study on the Prevalence of Urinary Tract Infection in Infants and Young Children with Acute Diarrhea**Ashutosh Kumar Verma¹, Samarjeet Grover², Shalini Kakar³**¹PG- Resident, Department of Pediatrics, Deen Dayal Upadhyay Hospital, New Delhi, India.²Senior Medical Officer, Department of Pediatrics, Deen Dayal Upadhyay Hospital, New Delhi, India.³Specialist Incharge, Department of Microbiology, Deen Dayal Upadhyay Hospital, New Delhi, India.

Received: 13-10-2023 Revised: 19-11-2023 Accepted: 26-12-2023

Corresponding author: Dr.Ashutosh Kumar Verma

Conflict of interest: Nil

Abstract**Aim:** The aim of the present study was to assess the prevalence of urinary tract infection in infants and young children with acute diarrhea.**Methods:** This descriptive hospital-based study was conducted in the Department of Paediatrics. In the study period 100 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.**Results:** In our study 15% of study population was found to have urinary tract infection. The most common organism isolated from the urine was E coli (10 cases) followed by Enterococci (n=2). Others were Klebsiella, Citrobacter and Alpha streptococci. In the present study group 10 of urinary tract infection cases were in the age group of 6 months to 1 year, followed by 3-6 years. Out of total 15 cases of urinary tract infection, 12 cases were females and 3 were males. Among the 15 positive urinary tract infection cases 9 children had normal nutritional status whereas rest 6 cases had grade 1 PEM according to Indian Academy of paediatrics classification. In 15 children with urinary tract infection, 8 were normally hydrated. 6 showed some signs of dehydration.**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.**Keywords:** diarrhea, urinary tract infection, infants, young childrenThis is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Urinary tract infections (UTI) are a common bacterial infection in infants and young children resulting in morbidity and mortality. [1] Urinary tract infections are common in children with an estimated incidence of 1-3% in boys and 3-10% in girls. [1] The long term consequences of UTI are renal parenchymal damage and renal scarring that can cause hypertension and progressive renal damage. [1,2] The signs and symptoms of UTI are nonspecific in infants and young children and also they do not usually pertain to the genitourinary tract. [3] Gastrointestinal symptoms of poor feeding, vomiting, abdominal pain and diarrhea are reported in many infants with UTI and also diarrhea can predispose infants and young children to develop UTI. [4,5] Under diagnosis of UTI results in inadequate treatment of UTI putting them at risk for renal scarring and the long term sequelae of hypertension and renal failure. [1]

Urinary tract infections (UTIs) are a common cause of acute illness in infants and children. Guidelines and recommendations on management of UTI were last published by the Canadian Paediatric Society (CPS) in 2004. [6] Since then, meta-analytic reviews investigating the utility of diagnostic tests, radiological assessment and randomized control treatment trials have been published. [7-10] In 2011, the American Academy of Pediatrics markedly revised its clinical practice guideline for diagnosing and managing initial febrile UTI in young children. [11] Since gastroenteritis (GE) is rampant in developing countries demonstration of an association between UTI and GE will be of clinical significance. [12] According to several studies conducted in India, the overall prevalence of UTI in children presenting primarily with diarrhea is 8%. [13]

The aim of the present study was to assess the prevalence of urinary tract infection in infants and young children with acute diarrhea.

Materials and Methods

This descriptive hospital-based study was conducted in the Department of Paediatrics Deen Dayal Upadhyay Hospital, New Delhi, India. In the study period 100 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.

A detailed history with importance to stool frequency, duration, colour, urinary symptoms, fever were collected and detailed clinical examination findings were recorded in a predesigned proforma.

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 >105 colony forming units.²

Positive urine culture-A positive urine culture was defined as growth of >105 colonies of a single urinary tract pathogen/ml of the specimen in a mid-stream of urine.²

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

Table 1: Occurrence of UTI in children with diarrhea and causative organisms

Urine culture	Frequency	Percent (%)
Positive	15	15
Negative	85	85
Total	100	100
Organisms	Frequency	
<i>E coli</i>	10	
<i>Klebsiella</i>	1	
<i>Enterococcus</i>	2	
<i>Alpha streptococci</i>	1	
<i>Citrobacter</i>	1	
Total	15	

In our study 15% of study population was found to have urinary tract infection. The most common organism isolated from the urine was E coli (10 cases) followed by Enterococci (n=2). Others were Klebsiella, Citrobacter and Alpha streptococci.

Table 2: Association of age and gender with UTI in study group

Age group (Years)	Urine culture results		
	Positive	Negative	Total
6m-1	10	24	34
1-3	4	32	36
3-6	1	29	30
Total	15	85	100
Gender			
Male	3	55	58
Female	12	30	42
Total	15	85	100

In the present study group 10 of urinary tract infection cases were in the age group of 6 months to 1year, followed by 3-6 years. Out of total 15 cases of urinary tract infection, 12 cases were females and 3 were males.

Table 3: Association of nutritional status and dehydration status with UTI in the study group

Anthropometry	Urine culture results		
	Positive	Negative	Total
Normal	9	51	60
Grade 1	6	29	35
Grade 2	0	3	3
Grade 3	0	2	2
Total	15	85	100
Dehydration			
No	8	76	84
Some	6	5	11
Severe	1	4	5
Total	15	85	100

Among the 15 positive urinary tract infection cases 9 children had normal nutritional status whereas rest 6 cases had grade 1 PEM according to Indian Academy of paediatrics classification. In 15 children with urinary tract infection, 8 were normally hydrated. 6 showed some signs of dehydration.

Discussion

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. [14] 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. [15]

In our study 15% of study population was found to have urinary tract infection. The most common organism isolated from the urine was E coli (10 cases) followed by Enterococci (n=2). Others were Klebsiella, Citrobacter and Alpha streptococci this was in concordance with Uppal et al [16] and Srivaths et al [17], Thakar et al [12] study. In the present study group 10 of urinary tract infection cases were in the age group of 6 months to 1 year, followed by 3-6 years. The most common age group in Thakar et al [12] study was 6 to 12 months

(75%) followed by 12 to 24 months (12.5%) which together constituted for 87.5%. This shows that younger the age group, more the nonspecific symptoms of UTI. Out of total 15 cases of urinary tract infection, 12 cases were females and 3 were males. Among the 15 positive urinary tract infection cases 9 children had normal nutritional status whereas rest 6 cases had grade 1 PEM according to Indian Academy of paediatrics classification. In 15 children with urinary tract infection, 8 were normally hydrated. 6 showed some signs of dehydration. 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 [4] 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.

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.

References

1. Indian Society Of Pediatric Nephrology. Revised statement on management of urinary tract infections. Indian Pediatr.2011;48:70916.
2. Smellie JM, Prescod NP, Shaw PJ, Risdon RA, Bryant TN. Childhood reflux and urinary infection: a follow-up of 10–41 years in 226 adults. Pediatric Nephrology. 1998 Nov;12:727-36.
3. Thakar R, Rath B, Prakash SK, Mittal SK, Talukdar B. Urinary tract infection in infants

- and young children with diarrhea. *Indian pediatrics*. 2000 Aug 1;37(8):886-9.
4. Stamey TA, Timothy M, Millar M, Mihara G. Recurrent urinary infections in adult women. The role of introital enterobacteria. *California medicine*. 1971 Jul;115(1):1.
 5. Bollgren I, Winberg J. The periurethral aerobic bacterial flora in healthy boys and girls. *Acta Paediatrica*. 1976 Jan;65(1):74-80.
 6. Davies HD, Canadian Paediatric Society, Infectious Disease and Immunization Committee Bag urine specimens still not appropriate in diagnosing urinary tract infections in infants. *Paediatr Child Health*. 2004;9(6):377-8.
 7. Bloomfield P, Hodson EM, Craig JC. Antibiotics for acute pyelonephritis in children. *Cochrane Database Syst Rev*. 2005; (1):CD003772.
 8. Hodson EM, Willis NS, Craig JC. Antibiotics for acute pyelonephritis in children. *Cochrane Database Syst Rev*. 2007;(4):CD003772.
 9. Montini G, Toffolo A, Zucchetto P, et al. Antibiotic treatment for pyelonephritis in children: Multicentre randomised controlled non-inferiority trial. *BMJ*. 2007;335(7616):386.
 10. Mori R, Lakhanpaul M, Verrier-Jones K. Diagnosis and management of urinary tract infection in children: Summary of NICE guidance. *BMJ*. 2007;335(7616):395-7.
 11. American Academy of Pediatrics, Subcommittee on Urinary Tract Infection, Steering Committee on Quality Improvement and Management. Roberts KB. Urinary tract infection: Clinical practice guideline for diagnosis and management of the initial UTI in febrile infants and children 2 to 24 months. *Pediatrics*. 2011;128(3):595-610.
 12. 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.
 13. BALAT A, HILL LL. Infectious diseases concomitant with urinary tract infections in children. *Turkish Journal of Medical Sciences*. 1999;29(1):65-8.
 14. Felton JM, Harries AD, Beeching NJ, Rogerson SJ, Nye FJ. Acute gastroenteritis: the need to remember alternative diagnoses. *Postgraduate Med J*. 1990;66(782):1037-9.
 15. Hari P, Srivastava RN. Urinary tract infection. In: Srivastava RN, Bagga A, editors. *Pediatric nephrology* 5th ed. New Delhi: Jaypee Brothers. 2011;273-300.
 16. Uppal SK, Srivastava VK, Mullick P, Vaishnava S. Association of gastroenteritis with urinary tract infection in infancy. *Indian pediatrics*. 1975 Feb;12(2):159-60.
 17. Srivaths PR, Rath B, Krishan Prakash S, Talukdar B. Usefulness of screening febrile infants for urinary tract infection. *Indian pediatrics*. 1996 Mar 1;33:218-9.