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Frequency of Urinary Tract Infection in Children Presenting with Acute Gastroenteritis in PIMS Islamabad

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[1] Collection of data, conception of the study and participated in its design, [2]design of the study and performed the statistical analysis along with drafting of manuscript [3]literature search for the discussion, questionnaire and helped in data collection and literature search data, [4]interpretation and final drafting of the manuscript [5,6]data interpretation and final drafting of the manuscript
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ABSTRACT

Objectives: To determine frequency of urinary tract infection (UTI) in children presenting with acute gastroenteritis (AGE) in PIMS Islamabad.

Methodology: This observational, cross-sectional study was carried out from June 2022 to December 2022 at pediatric isolation department PIMS Islamabad. A total of 160 children fulfilling the inclusion criteria were included in the study. At the time of inclusion baseline characteristics were documented. After that all the children who presented and admitted with acute gastroenteritis were assessed for presence of urinary tract infection through a standardized "mid-stream" urine sample collection protocol and sending obtained samples to in-hospital laboratory for diagnosis. Data was analyzed using SPSS 22:00.

Results: In our study, mean age of included children was 3.57 ± 1.14 years. 42 (26.25%) male and 118 (73.75%) female children were included. Mean duration of having gastroenteritis was 3.48 ± 1.93 days. Frequency of urinary tract infection in the children who presented with acute gastroenteritis was 24 (15.00%). Most common organism which was isolated as a culprit of UTI was Escherichia Coli 18 (75.00%).

Conclusion: Urinary tract infection (UTI) is a common comorbid condition in children who present with acute gastroenteritis.

Keywords: Acute gastroenteritis, Frequency, UTI.

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Introduction

Acute gastroenteritis is a disease that is quite common among children who are younger than six years old. It is also a big contributor to child mortality in underdeveloped nations, which is where the use of unclean water that is contaminated with fecal matter is an important contributor to acquiring this condition [1]. Principal pathogenic organisms responsible for acute gastroenteritis in children are *Rotavirus*, *Cryptosporidium*, *Shigella*, and enterotoxigenic *Escherichia coli*, with *Rotavirus* being the most common cause in children younger than two years of age and *Shigella* being the most common cause in children older than two years of age. [2, 3] It is one of the most prevalent infectious disease among pediatric age group. In addition to this, another highly prevalent infectious disease in this particular age group is urinary tract infection.[4]

There are many host-related elements, such as obstruction in the physiologic track of urine passage, kidney or bladder stones, persistence of some residual urine due to inadequate emptying of the bladder, lack of practice to circumcise male children and constipation that might raise the risk of a urinary tract infection in a child.[5] During early phase of childhood, UTI is found much more in male children as compared to their female counter parts but as the age increases this trend reverses and more female children are found to be affected by UTI and in most cases these children have symptoms of UTI.[6]

UTIs in young children sometimes go undiagnosed because their symptoms are too general and ambiguous which endanger the lives of ailing children and if not evaluated and treated quickly can lead to hypertension and progressive renal damage.[7]

It has been observed that in many cases, children with UTI in reality present with somewhat unrelated set of signs and symptoms that correspond to acute gastroenteritis instead of urinary tract infection. [8]As a result, not only such children get an appropriate treatment but also due to presence of a set of symptoms unrelated to genitourinary system they are not even considered to have their urine samples analyzed for having a urinary tract infection. [9] Owing to such an overlap it is essential to determine the burden of UTI among the children who are having gastroenteritis in order to decide whether urinalysis should be opted as part of standard care while managing children who present with acute gastroenteritis. In pursuance of this goal, we conducted this study to determine the frequency of UTI in children who presented at our institution with acute gastroenteritis.

Methodology

We conducted this randomized controlled trial at department of Pediatric Medicine in Children hospital PIMS Islamabad, Pakistan from June 2022 to December 2022 after obtaining approval from the ethical review board of SZABMU PIMS, Islamabad, ERB No. F 1-1/2015/ERB/SZABMU/960. Sample size of 160 was calculated using WHO sample size calculator by assuming confidence level of 95%, absolute precision of 7% and anticipated frequency of UTI in children who present with acute gastroenteritis of 27% [10] using WHO formula [11]

We included children who had the ages between 6 months to 6 years, who were either male or female, presented at our institution with acute gastroenteritis with as passage of 3 or more liquid stools for more than 2 days but less than 14 days.[12]

We excluded syndromic children, children with acute kidney injury (AKI), children with chronic kidney disease (CKD) and children with any congenital anatomical abnormalities.

We selected our study population by using non-probability consecutive sampling method. A written consent which was signed by the parents of all the study participants was made an essential pre-requisite. Baseline characteristics of all the included study participants, including age, gender, weight (in kilograms), height (in centimeters) and duration of gastroenteritis were documented. In order to make a diagnosis of UTI standard protocol of midstream urine collection [13] was used. Two mid-stream clean catch urine samples were collected in sterile container. All the samples were stored carefully and sent within 30 minutes to the hospital laboratory for assessment and urine culture to make diagnosis of UTI. Diagnosis of UTI will be based on American Academy of Pediatrics guidelines which defines UTI in children as "A positive urine cultures with>10^5 colonies/ml or positive pus cell, nitrites or leucocyte esterase on urine sample obtained by clean catch midstream urine.[14]

Data was analyzed by using Statistical Package for Social Sciences (SPSS) 22.00. Quantitative data was represented using mean with standard deviation. Qualitative data was represented by using percentage and frequency. Chi square test and Student t-test were applied where appropriate and a p-value of ≤ 0.05 was considered as statistically significant.

Results

In our study, a total of 160 children presenting with acute gastroenteritis were included. We found out that the mean age of included children was 3.57 ± 1.14 years. In our study, there were 42 (26.25%) male participants while remaining 118 (73.75%) participants were female. Mean weight of children was 15.83 ± 3.05 kg. Mean height of children in my study was 98.89 ± 9.16 cm. Mean duration of having gastroenteritis was 3.48 ± 1.93 days. These are summarized in table I

Table I: Baseline characteristics.

Characteristics	Value (n = 160)
Mean age	3.57 ± 1.14 years
Gender	
- Male	42 (26.25%)
- Female	118 (73.75%)
Mean weight	15.83 ± 3.05 kg
Mean height	98.89 ± 9.16 cm
Mean duration of having gastroenteritis	3.48 ± 1.93 days

We found that the frequency of urinary tract infection in the children who presented with acute gastroenteritis was 24 (15.00%). Amongst these we found that 6 (25.00%) were male children while 18 (75.00%) children were female.

We also found out that the most common organism which was isolated as a culprit of UTI in our study population was Escherichia Coli 18 (75.00%) followed by

Enterobacter spp. 2 (8.32%), Klebsiella spp. 1 (4.17%), Proteus spp. 1 (4.17%), Enterococcus spp. 1 (4.17%) and Serratia spp. 1 (4.17%) as depicted in table II.

Table II: Organisms causing UTI.

Organism Isolated	n (%)
Escherichia Coli	18 (75.00%)
Enterobacter spp.	2 (8.32%)
Klebsiella spp.	1 (4.17%)
Proteus spp.	1 (4.17%)
Enterococcus spp.	1 (4.17%)
Serratia spp.	1 (4.17%)

Discussion

Diarrhea is the leading cause of morbidity in newborns and young children around the world. It is highly prevalent among infants and toddlers and has been linked to an elevated risk of fatality and hospitalization.[15] Studies have shown that urinary tract infections (UTIs) are the most prevalent reasons for looser stools in youngsters and also constitute one of the most common complication that is usually encountered in association with diarrhea. [16, 17] In fact, a case control study was conducted by Fallahzadeh *et al.* [18] in which they placed children with acute gastroenteritis in the case group while those without diarrhea were placed in the control group. They reported that the frequency of UTI was significantly higher in the children with concomitant diarrhea i.e., the cases, as compared to the controls.

In our study, we found that a significantly high number of children who presented at our institution were found to have concomitant urinary tract infection. In relation to the frequency of our study, there are some previous studies like Soleimani *et al.* [11], Singraiah *et al*[19] and Akbar *et al*[20] that have reported a relatively higher frequency of UTI in children with AGE as compared to our study i.e15-17%. Contrary to what we found in our study, Saeedi *et al*[21] reported much lower frequency of UTI in children presenting with acute gastroenteritis i.e7.5%. In our study, we found that most patients who had UTI had female gender. This may be due to higher propensity of UTI in female children as compared to male children.[6, 22] In our study, we found that the most common infectious culprit that caused urinary tract infection in children was *Escherichia coli* which has been reported by a number of previously conducted studies in this regard. [23, 24]

Based on findings of our study, we recommend that, owing to the high frequency of presence of UTI in concomitance with acute gastroenteritis, adding urinalysis as a routine investigation during the work up of a child with acute gastroenteritis should be considered. This may help reducing the misdiagnosis and mistreatment of children who in reality have UTI but are considered a case of AGE. This will have a positive impact on the health outcome of children in our community.

Conclusion

Urinary tract infection (UTI) is a common comorbid condition in children who present with acute gastroenteritis and addition of urinalysis as a routine investigation during the work up of a child with acute gastroenteritis should be considered.

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References

1. Ugboko HU, Nwinyi OC, Oranusi SU, Oyewale JO. Childhood diarrhoeal diseases in developing countries. Heliyon. 2020;6(4):e03690. doi: 10.1016/j.heliyon.2020.e03690.
2. Kotloff KL. The burden and etiology of diarrheal illness in developing countries. Pediatr Clin North Am. 2017;64(4):799-814. doi: 10.1016/j.pcl.2017.03.006.
3. Elliott EJ. Acute gastroenteritis in children. BMJ. 2007;334(7583):35-40. doi: 10.1136/bmj.39036.406169.80.
4. Okarska-Napierała M, Wasilewska A, Kuchar E. Urinary tract infection in children: Diagnosis, treatment, imaging - Comparison of current guidelines. J Pediatr Urol. 2017;13(6):567-573. doi: 10.1016/j.jpurol.2017.07.018.
5. Chang SL, Shortliffe LD. Pediatric urinary tract infections. Pediatr Clin North Am. 2006;53(3):379-400, vi. doi: 10.1016/j.pcl.2006.02.011.
6. Stull TL, LiPuma JJ. Epidemiology and natural history of urinary tract infections in children. Med Clin North Am. 1991;75(2):287-297. doi: 10.1016/s0025-7125(16)30454-0.
7. Hellerstein S. The long-term consequences of urinary tract infections: a historic and contemporary perspective. Pediatr Ann. 1999;28(11):695-699. doi: 10.3928/0090-4481-19991101-09.
8. Stein R, Dogan HS, Hoebeke P, Kočvara R, Nijman RJ, Radmayr C, *et al.*; European Association of Urology; European Society for Pediatric Urology. Urinary tract infections in children: EAU/ESPU guidelines. Eur Urol. 2015;67(3):546-558. doi: 10.1016/j.eururo.2014.11.007.
9. 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 Gen Pract. 2013;63(607):e156–164. doi: 10.3399/bjgp13X663127.
10. Soleimani G, Bojd SS, Teimouri A, Shahri ES, Dehujy EK. Evaluation of urinary tract infection in children with

gastroenteritis. J Compr Ped. 2016;7(2):e31866. doi: 10.17795/compreped-31866.
11. Charan J, Biswas T. How to calculate sample size for different study designs in medical research? Indian J Psychol Med. 2013;35(2):121-126. doi: 10.4103/0253-7176.116232.
12. Hartman S, Brown E, Loomis E, Russell HA. Gastroenteritis in children. Am Fam Physician. 2019;99(3):159-165.
13. Kaufman J, Temple-Smith M, Sanci L. Urinary tract infections in children: an overview of diagnosis and management. BMJ Paediatr Open. 2019;3(1):e000487. doi: 10.1136/bmjpo-2019-000487.
14. Subcommittee on Urinary Tract Infection, Steering Committee on Quality Improvement and Management; Roberts KB. Urinary tract infection: clinical practice guideline for the diagnosis and management of the initial UTI in febrile infants and children 2 to 24 months. Pediatrics. 2011;128(3):595-610. doi: 10.1542/peds.2011-1330.
15. Radlović N, Leković Z, Vuletić B, Radlović V, Simić D. Acute diarrhea in children. Srp Arh Celok Lek. 2015;143(11-12):755-62. doi: 10.2298/sarh1512755r.
16. Ladomenou F, Bitsori M, Galanakis E. Incidence and morbidity of urinary tract infection in a prospective cohort of children. Acta Paediatr. 2015;104(7):e324-329. doi: 10.1111/apa.12992.
17. Nibhanipudi KV. A study to determine the incidence of urinary tract infections in infants and children ages 4 months to 6 years with febrile diarrhea. Glob Pediatr Health. 2016;3:2333794X16667175. doi: 10.1177/2333794X16667175.
18. Fallahzadeh MH, Ghane F. Urinary tract infection in infants and children with diarrhoea. East Mediterr Health J. 2006;12(5):690-694.
19. Singraiah A, Hegde P. Urinary tract infection in children presenting with diarrhoea. Int J Contemp Pediatr. 2021;8(7):1172-1175. doi: 10.18203/2349-3291.ijcp20212467.
20. Akbar A, Khan AM, Khan A, Ahmad F, Akram M, Sultan AN. Frequency of urinary tract infection in children with diarrhea. Pak J Med Health Sci. 2021;15(6):1885-1887. doi: 10.53350/pjmhs211561885.
21. Saeedi F, Malekzadeh I, Moghtaderi M. Urinary tract infections in children presenting with acute gastroenteritis. Asian J Pediatr Nephrol. 2021;4(1):19-21. doi: 10.4103/ajpn.ajpn_38_20.
22. Tullus K, Shaikh N. Urinary tract infections in children. Lancet. 2020;395(10237):1659-1668. doi: 10.1016/S0140-6736(20)30676-0.
23. Afridi JM, Amir S, Rehman Y, Rahim F. Urinary tract infection as a cause of parenteral diarrhea in children. Med Forum Mon. 2018;29(5):11-14.
24. Alberici I, Bayazit AK, Drozdz D, Emre S, Fischbach M, Harambat J, *et al.*; ESCAPE Study Group; PREDICT Trial. Pathogens causing urinary tract infections in infants: a European overview by the ESCAPE study group. Eur J Pediatr. 2015;174(6):783-790. doi: 10.1007/s00431-014-2459-3.