



Urinary Tract Infection and its Antibiotic Sensitivity in Acute Childhood Diarrhoea

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ABSTRACT

Introduction: Diarrhoea is responsible for nearly 18% of total deaths in children. In early childhood, symptoms of diarrhoea may be similar to urinary tract infection (UTI). This study was designed to determine the prevalence of UTI and its antibiotic sensitivity in children hospitalized with acute diarrhoea. **Methods:** All cases of acute diarrhoea aged 1-60 months and hospitalized in 2009-2011 in Abuzar children's hospital (the main referring educational hospital in southwestern Iran) were enrolled. They were included if diarrhoea lasted <14 days, stool passage >3 times a day and antibiotics were not used in the past two days. Sensitivity and resistance of cultures were evaluated for common antibiotics. **Results:** Out of the total 575 subjects, 31 (5.4%; 18 males ≈ 58%, 13 females ≈ 42%) were confirmed to have a UTI. There was no sex difference ($P=0.012$), but 77.4% of the subjects were <12 months of age ($P=0.012$; $OR=2.89$). The results of urine culture were reported as follows: 27 cases (87.1%), *Escherichia coli*; two (6.5%), *Enterococcus*; one (3.2%), *Pseudomonas*; and one subject (3.2%), *Klebsiella*. Antibiotic sensitivity was found to be 93.5% to Nitrofurantoin, and 61.3% to Ceftriaxone and Nalidixic acid. They were resistant in 67.7% to Co-trimoxazole and 64.5% to Gentamicin. **Conclusion:** Although UTI is not so much frequent in childhood acute diarrhoea, it must be considered especially in infancy.

Keywords: Urinary Tract Infection (UTI), Acute diarrhoea, Antibiotic sensitivity, Antibiotic resistance, Children

INTRODUCTION

Almost 1.8 million child deaths due to diarrheal diseases are reported annually. Based on WHO reports, more than 700 million diarrheal episodes happen in children younger than 5 yrs. in developing countries [1,2]. Urinary tract infection (UTI) occurs in 3% to 5% of girls and 1% of boys and is a relatively common problem in childhood [3,4]. However, UTI only looks like a simple disease: it has some important aspects: 1) clinical symptoms are non-specific and sound similar to other common childhood illnesses [5-7]; 2) it could be due to functional or structural abnormalities of the urinary tract system; 3) in case of delay to diagnose or treat, it can result in serious complications such as renal scarring, renal failure, and hypertension; 4) particularly in infants, no specific sign exists and it may remain undiagnosed; and 5) early diagnosis and treatment, and proper management prevent its complications [8].

Objectives

Diarrhoea is a common symptom in UTI in early childhood. How much is necessary to check diarrheal episodes to find possible UTI? Since diarrhoea is a common illness in developing countries, finding a relationship between UTI and diarrhoea, as the studies in this case are limited, will be of clinical significance. The present study was performed to find the frequency of UTI and their antibiotic sensitivity in hospitalized children with acute diarrhoea.

MATERIALS AND METHODS

This is a retrospective study and the data was extracted from the hospital's archive during 2009-2011. They were included if the patients aged 1-60 months, had diarrhoea >3 times a day and lasted <14 days, and were not receiving any antibiotic within 48 hours prior to admission.

Cultures were considered positive if it was >105 CFU/ml from a midstream or bag collection, >104 by catheter collection, and >103 from a supra-pubic aspiration sample [9], and the antibiotic sensitivity and resistance was measured by diffusion method.

The sample size of 575 subjects was calculated based on the result of previous studies [10,11] using the formula $[n=Z^2_{1-\alpha/2} \times p(1-p)/d^2]$, where we considered $\alpha=0.05$, $p=0.1$, and $d=0.02$.

Data were analysed with SPSS 18.0 for Windows (SPSS Inc., Chicago, IL, USA). The Chi square and t-test were used to make a statistical analysis. A $P < 0.05$ was considered statistically significant.

RESULTS

A total number of 575 patients (343≈60% male, 232≈40% female) were included; thirty-one (5.4%) were found to have UTI among whom eighteen (58%) were male and thirteen (42%) were female, and 76% were <12 months (Table 1). Pathogens found in positive cultures are reported in Table 2. Antibiotic sensitivity and resistance are presented in Table 3.

Table 1 Frequency of urinary tract infection (UTI) in childhood acute diarrhoea by age

UTI	2-6 mo	6-12 mo	>12 mo	Total
Positive	142 (26.1)	153 (28.1)	249 (45.8)	544 (100)
Negative	11 (35.5)	13 (41.9)	7 (22.6)	31 (100)
Total	153 (26.6)	166 (28.9)	256 (44.5)	575 (100)

Numbers in parenthesis show percentage

Table 2 Pathogens of urinary tract infection (UTI) in childhood acute diarrhoea

Organism	Number	Percent
<i>E. coli</i>	27	87.1
<i>Enterococcus</i>	2	6.5
<i>Pseudomonas</i>	1	3.2
<i>Klebsiella</i>	1	3.2

Table 3 Susceptibility and resistance to antibiotics, for organisms responsible for urinary tract infection (UTI) in childhood acute diarrhoea

Antibiotic	Resistance	Sensitivity
Ceftriaxone	38.7	61.3
Nalidixic acid	38.7	61.3
Nitrofurantoin	6.5	93.5
Gentamicin	64.5	35.5
Co-trimoxazole	67.7	32.3

Frequency of UTI was not different by gender ($P=0.853$), but a significant difference was found for age ($P=0.012$) so that 77.4% of the UTI subjects were <12 months of age ($OR=2.89$) (Table 1).

DISCUSSION

Of the 575 subjects in the study, 31 subjects (5.4%) had UTI from whom 18 subjects (58%) were male and 13 (42%) were female.

The frequency of UTI in patients with diarrhoea has been reported from 5.4% to 11.76% in different studies. Our literature review discovered the studies of Fallahzadeh and Ghane with 6.7% [12], Pryles, 7% [13], Thakar 8% [14], Cardone Gabriella Richard 8.5% [15] and Srivaths 11.76% [11], but our result was similar to that reported by Dharnidharka (5.4%) [16].

In the study by Srivaths [11], in terms of gender, no statistical differences were found in the amount of UTI in the study group; however, most of the studies by Fallahzadeh and Ghane [12], Thakar [14], and Dharnidharka [16] have reported more UTI in girls. Even an infection of 100% in girls has been reported in a study by Pryles [13].

In our study, 77.4% of the UTI subjects were <12 months ($P=0.012$). A similar age preference was found in the studies by Fallahzadeh and Ghane [12], Pryles [13] and Thakar [14] by 87.5%, 66.6%, and 85.7%, respectively. Interestingly, 100% of UTI found in the patients of Srivaths and colleagues were <10 months [11].

In terms of the type of organism, *E. coli* was the most frequently observed organism isolated from urine cultures (87.1%), which was similar to the studies by Shaw and Fallahzadeh with almost 90% [17]. Similar predominance with a fewer frequency was found in the studies by Thakar [14] and Dharnidharka [16] by 71.4% and 58.7%, respectively.

In the present study, *Klebsiella* has been isolated from 3.2% of samples, which was less than that of the study by Thakar (29.6%) [14] and the study by Dharnidharka 14.3% [16]. *Pseudomonas* has also been isolated from 3.2% of samples that was less than that by Fallahzadeh (12.5%) [17]. As it can be seen in the majority of the studies, *E. coli* is the most common organism generating UTI.

The resistance of the organisms to Ceftriaxone and Gentamicin was 38.7% and 64.5% respectively. Interestingly, it was similar to Valavi's study [10] performed in our region, which reported them as 27.4% and 64.8%, respectively. This similarity increases the reliability of the two studies mentioned above.

The limitations of this study were: antibiotic resistance was assessed by disk diffusion in this study while using minimal inhibitory concentration (MIC) could give results that are more accurate; incomplete records of some patients can interfere results; and, studies with more patients may have results that are more accurate.

CONCLUSION

This study found UTI in 5.4% of the subjects with acute diarrhoea, mostly <12 months of age and resistant to ceftriaxone, the commonest used antibiotic. According to the association of UTI and diarrhoea, especially if the patients are febrile and younger than one year, ruling out urinary tract infection and attention to the state of antibiotic resistance are of particular importance.

Finally, a case-control study might determine UTI risk factors in children with acute diarrhoea to perform an appropriate urinary tract culture and treatment.

DECLARATIONS

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Disclosure Statement

There is nothing to disclose.

Conflict of Interest

There is no conflict of interest.

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