

# Urinary Tract Infection and Enuresis in Children With Chronic Functional Constipation

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**Keywords.** urinary tract infection, constipation, child

**Introduction.** There is still controversy regarding the possible role of chronic functional constipation in disorders of the urinary tract, specifically urinary tract infection (UTI) and enuresis. The aim of this study was to investigate the frequency of (UTI) and enuresis in children with chronic functional constipation.

**Materials and Methods.** We included 120 children (60.8% girls) with chronic functional constipation based on the Rome III criteria. Detailed history of UTI and enuresis or symptoms pointing to these diagnoses was obtained. Urinalysis, urine culture, and abdominal ultrasonography were performed for all of the participants.

**Results.** The mean age of the patients was  $7.4 \pm 3.2$  years. Seventy-five percent of the patients had constipation for more than 1 year. The most common urinary symptoms were dysuria (16.7%), urinary frequency (12.5%), and dribbling (4.2%). The frequencies of nocturnal and daytime enuresis were 22.5% and 3.3%, respectively. Pyuria was seen in 10 girls (8.3%). Overall, 7 patients (5.8 %) had a positive urine culture, of whom all were girls and 6 had pyuria. Urinary tract ultrasonography was normal in these patients.

**Conclusions.** Urinary symptoms, especially nocturnal enuresis, were found in a significant number of children who had chronic functional constipation, but UTI was not so common in the present study. Therefore, we suggest that nocturnal enuresis be considered in children with chronic functional constipation, but screening for UTI is not recommended in these patients.

IJKD 2013;7:363-6  
www.ijkd.org

## INTRODUCTION

The daily bowel habits of children are extremely susceptible to any changes in routine environment.<sup>1</sup> Constipation has been defined as a delay or difficulty in defecation for 2 weeks or longer, sufficient to cause significant distress to the patient,<sup>2,3</sup> or as the passage of fewer than 3 bowel movements each week for at least 2 consecutive weeks.<sup>4</sup> In the vast majority of children, especially the younger ones, no structural, endocrine, or metabolic etiology is identified and constipation is called “idiopathic” or “functional.”<sup>2,5,6</sup> Functional constipation is

difficult to treat, and the relapse rate is high.<sup>2</sup> It is estimated that the worldwide prevalence of childhood constipation vary widely from 0.3 % to 28%.<sup>6</sup> Functional constipation is the second most common reason that a child is referred to a pediatric gastroenterologist accounting for up to 25% of all visits.<sup>1,5</sup>

Urinary tract infection (UTI) is defined as bacteriuria along with urinary symptoms. Epidemiology of UTI during childhood varies by age, sex, and other factors. Urinary tract infection commonly affects boys during the first year of life,

but thereafter, 3% to 5% of girls are affected, which increases to 10% by the teenage years.<sup>7</sup> A relation between chronic functional constipation and UTI has been suggested in previous studies, and it is shown that the frequency of UTI decreases with treatment of constipation.<sup>8,10</sup>

The purpose of this study was to evaluate the frequency of UTI and enuresis in children with chronic constipation referred to the main Pediatric Gastroenterology Clinical Center in our area.

## MATERIALS AND METHODS

### Patients

One hundred and twenty children with chronic functional constipation were enrolled in this cross-sectional study. They were followed up at the Pediatric Gastroenterology Clinic affiliated to Shiraz University of Medical Sciences. The Ethics Committee of Shiraz University of Medical Sciences approved the study protocol, and informed consent of the parent was obtained for all participants.

We used Rome III criteria for definition of functional constipation,<sup>11</sup> ie, 2 or more of the following in a child with a developmental age of at least 4 years with insufficient criteria for diagnosis of inflammatory bowel syndrome: 2 or fewer defecations in the toilet per week; at least 1 episode of fecal incontinence per week; a history of retentive posturing or excessive volitional stool retention; a history of painful or hard bowel movements; presence of a large fecal mass in the rectum; and a history of large-diameter stools that may obstruct the toilet. The criteria in infants and children up to 4 years of age were 1-month presence of at least 2 of the following at least once per week for at least 2 months before diagnosis: 2 or fewer defecations per week; at least 1 episode or week of incontinence after the acquisition of toileting skills; a history of excessive stool retention; a history of painful or hard bowel movements; presence of a large fecal mass in the rectum; and a history of large-diameter stools which may obstruct the toilet.

The exclusion criteria were anatomical causes of constipation (eg, Hirschsprung disease and spinal disease), constipation due to another disorder (eg, hypothyroidism and psychomotor retardation), prior anal surgery, and use of medications that can cause constipation. Also, patients who had organic causes for constipation were excluded from study. Patients were eligible for the study if they had no

underlying chronic medical condition requiring regular follow-up (except for the constipation), had no developmental abnormalities, and took no medication that could account for UTI and constipation.

### Study Design

On enrollment, the patients themselves or their parents, if they were less than 10 years old, were interviewed. A questionnaire including specific items about bowel habits and any sign and symptoms of UTI (such as urine frequency, pyuria, dribbling, and daytime and nighttime enuresis) were filled for all patients. Complete clinical examination was performed for every patient. Urine analysis and urine culture were taken from the midstream urine for all of the patients. If any of those were positive or suspicious, the urine culture was repeated via catheter or suprapubic sampling. Participants with UTI were referred to the pediatric nephrologist for further evaluation and management.

Data analysis was performed using the SPSS software (Statistical Package for the Social Sciences, version 15.0, SPSS Inc, Chicago, Ill, USA). The chi-square test was used for comparison of frequencies between groups. The results were expressed as frequencies or mean  $\pm$  standard deviation, where appropriate.

## RESULTS

One hundred and twenty patients with chronic functional constipation (73 girls; 60.8%) with a mean age of  $7.4 \pm 3.2$  years were enrolled in the study. The mean duration of constipation was  $2.2 \pm 1.9$  years (range, 3 months to 10 years) and the mean time between each defecation was  $5.8 \pm 3.4$  days (ranges, 2 to 20 days). Most of the patients ( $n = 111$ ; 92.5%) had received polyethylene glycol for the treatment of constipation and 5 patients (4.1%) had no history of using any medication.

Twenty patients (16.7%) had dysuria, 15 (12.5%) had urinary frequency, 5 (4.2%) had dribbling, 4 (3.3%) had daytime enuresis, and 27 (22.5%) had nighttime enuresis (Table). As to the reports of urinalysis, 10 patients (8.3%) had pyuria (urine leukocyte,  $> 5$  to 6 per high-power field), 5 patients (4.2%) had hematuria, and 4 patients (3.3%) had a positive urine nitrite. Of 10 patients who had pyuria, 6 (5%) had a positive urine culture. One

Frequency of Urinary Tract Symptoms and Signs in Children With Chronic Constipation

Symptoms	Girls (%)	Boys (%)	All Children (%)	P
Night time enuresis	13 (17.8)	14 (29.8)	27 (22.5)	.19
Dysuria	13 (17.8)	7 (14.9)	20 (16.7)	.87
Frequency	11 (15.1)	4 (8.5)	15 (12.5)	.43
Dribbling	4 (5.5)	1 (2.1)	5 (4.2)	.66
Daytime enuresis	4 (5.5)	0	4 (3.3)	.26

patient (0.8%) had a positive urine culture with no pyuria.

Overall, 7 patients (5.8 %) had a positive urine culture. All of them were girls. The type of microorganism grown in the urine culture was *Escherichia coli* (71.4%), *Enterobacter* (14.3%), and coagulase-positive *Staphylococcus* (14.3%). Imaging studies were normal in all patients with documented UTI. All of the patients with enuresis and constipation had regular follow-up in the Gastroenterology Clinic for at least 6 months by a gastroenterologist and received dietary regimen and polyethylene glycol and asked about enuresis. All of them except 1 with daytime enuresis showed improvement.

## DISCUSSION

Constipation is a common pediatric problem, which remains underdiagnosed and poorly treated in a significant number of patients, and it may lead to significant functional impairment.<sup>12</sup>

Although little research has focused on the underlying causes and natural history of constipation during early childhood,<sup>6</sup> it seems that the frequency of UTI and urgency is higher in children with chronic functional constipation. Fecal and urinary incontinence was significantly more commonly observed in children with constipation than in those without constipation.<sup>10</sup>

Rectal distension due to fecal retention in chronic functional constipation causes bladder distortion and may cause stimulation of detrusor stretch receptors resulting in detrusor proneal dyssynergism.<sup>4</sup> Distortion of the trigonal area may result in failure of urethral valve competence and allow for vesicoureteral reflux.<sup>13</sup> Several reports suggested that constipation may induce uninhibited bladder contraction which may lead to urinary tract problems, including UTI, enuresis, urgency, and vesicoureteral reflux. These data suggest that constipation should be considered

as an unrecognized etiologic factor for urinary tract problems in childhood, and children with UTI, enuresis and vesicoureteral reflux should be thoroughly assessed for coexisting constipation.<sup>5,9,14-17</sup>

In many cases, the treatment of chronic constipation may be the most important remedy for pyuria, bacteriuria, and enuresis.<sup>16,18</sup> Relief of constipation results in disappearance of daytime urinary incontinence in 89%, nighttime urinary incontinence in 63%, and recurrent UTI in all patients who have no anatomic abnormality of the urinary tract.<sup>8</sup> Parents of young children should be taught about the recognition, prevention, and early intervention of constipation via guidance and recommendation; therefore, the child will be less likely to develop urinary tract problems in the context of constipation.

Our study showed that the frequency of UTI in patients with constipation was 5.8%. This is in contrast with previous studies indicating that the frequency of UTI and urgency is significantly higher in patients with constipation.<sup>9,10</sup> Also, UTI is more common in girls than boys and the prevalence of daytime enuresis is lower than nocturnal enuresis, but there was a female predominance that was similar to previous studies.<sup>10,19</sup>

## CONCLUSIONS

Urinary symptoms, especially nocturnal enuresis, were reported in a significant number of children who had chronic functional constipation, but the frequency of UTI was not so high. Therefore, although screening for UTI is not recommended for all of the patients with constipation, in the case of referral of constipated patients, history of enuresis should be taken. Also, urinalysis, urine culture, and renal ultrasonography are suggested if signs and symptoms of UTI are positive.

## ACKNOWLEDGEMENTS

The authors would like to thank Dr Nasrin Shokrpour at the Center for Development of Clinical Research of Nemazi Hospital for editorial assistance. The present article was extracted from the thesis written by Marzieh Matin and was financially supported by Shiraz University of Medical Sciences grant No 874340.

## CONFLICT OF INTEREST

None declared.

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Received July 2012  
 Revised December 2012  
 Accepted January 2013