Self-Report of Difficult Defecation Is Associated With Overactive Bladder Symptoms

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Aims: The association of dysfunctional bowel elimination with lower urinary tract symptoms is well known in children, but not in adults. It was our objective to assess lower urinary tract symptoms (LUTS) in women who report difficult defecation (DD). **Methods:** This is a secondary analysis of 2,812 women, aged 35–64, who participated in a telephone interview. All subjects were asked "When you move your bowels, does the stool come out easily?" DD was considered present in those answering "no." All subjects were queried regarding LUTS, urinary infections in the past year, self-perceived health status, medical history, and demographics. Symptoms of stress incontinence (five items), urge incontinence (five items), and the impact of these symptoms on their quality of life were solicited from subjects reporting more than 12 episodes of incontinence in 1 year. **Results:** DD was reported by 10.4% (290/2,790) of women. Women with DD had higher LUTS than those who did not: nocturia (mean 1.8 ± 0.1 vs. 1.3 ± 0.0), urgency (47.6% vs. 29.2%), increased daytime frequency (mean 8.2 ± 0.3 vs. 7.2 ± 0.1), dysuria (22.9% vs. 13.7%), and a sensation of incomplete bladder emptying (55.6% vs. 28.2%). DD women were more often menopausal, reported a fair or poor self-reported health status, and had a higher number of comorbidities, less formal education, and lower annual household income. **Conclusions:** Women with symptoms of DD have an increased rate of LUTS, consistent with the diagnosis of overactive bladder without incontinence. The pathophysiology underlying this association is worthy of future research. *Neurourol. Urodynam. 29:1290–1294, 2010.* © 2010 Wiley-Liss, Inc.

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AIMS

An association in children between constipation and lower urinary tract symptoms (LUTS) is a relatively recently appreciated phenomenon.[1] In the majority of children, functional rather than anatomical abnormalities are often responsible for urinary tract infections, urinary incontinence (UI), urgency, and frequency. These neurologically normal children were previously labeled as "dysfunctional voiders" and were given bladder retraining and timed voiding as treatment. However, this perception changed dramatically after it was shown that constipation and voluntary fecal retention was actually the major contributor to their urinary symptoms. By treating the constipation daytime incontinence was relieved in 90% of children and recurrence of urinary tract infections was eliminated.[1] The constellation of childhood symptoms of constipation, fecal incontinence, and painful bowel movements combined with urinary symptoms of frequent urinary tract infections, urge incontinence, urgency, and frequency in the anatomically normal child is now called dysfunctional elimination (DE) syndrome.[2]

There exist some data about the link between bowel and bladder symptoms in the adult,[3,4] but unless a woman is being seen by a physician who specialized in pelvic medicine there is usually no one physician who queries her about both of these symptoms.

Two studies have investigated the impact of having had DE as a child on symptoms as an adult. Both of these studies have found that adult women with LUTS reported more childhood DE symptoms than women who did not.[5,6] Little is known about the urologic impact of adult dysfunctional bowel elimination, or difficult defecation (DD) in adults.

Based on clinical observations and the known association between bowel and bladder symptoms in children we hypothesized that women with DD would have more LUTS than women who do not. Our aim was to assess if LUTS are more common in women that report DD. The LUTS of particular interest included overactive bladder (urgency with or without urgency incontinence, frequency, and nocturia) and stress incontinence.

METHODS

This is a secondary analysis of 2,812 community dwelling women, aged 35–64, who participated in a telephone interview as part of an epidemiologic study of UI prevalence among White and Black women.[7] These women were sampled from 12,541 telephone records from three southeast Michigan counties with the study goal of interviewing 1,500 black women and 1,000 white women. The research protocol was approved by the institutional review board of the University of Michigan Medical School (IRB#2000-0824).

Information brochures and a letter introducing the study were mailed to the address associated with the telephone number and soon thereafter a trained female professional telephone interviewer from the Survey Research Center of the University of Michigan Institute for Social Research called the household to screen for eligible participants. Inclusion criteria were women between the ages of 35 and 64 who self-identified as black or white race who had not been pregnant in the past 12 months. Eligible women who consented verbally were assessed for demographic characteristics, health history, lifestyle factors, obstetric, and gynecologic history and LUTS including UI.

The protocol for the sampling of the population and for the questionnaire survey has been described.[7] There was a 69% response rate.

All subjects were asked "When you move your bowels, does the stool come out easily?" DD was considered present in those answering "no." The answers of women with and without DD were compared with respect to number of bowel movements per week, bladder storage symptoms per ICS Standardized terminology (number of nocturia episodes, the presence of urgency, and UI), number of daytime voids (frequency), presence of urinary infections in the past year, dysuria, feelings of incomplete emptying, and the need to locate the nearest toilet as soon as arriving at a new place. The women were also asked to rate their self-perceived health status as excellent, very good, good, fair, or poor. Any woman who reported leaking urine 12 or more times in the past 12 months was asked additional questions regarding their urine loss. These included five items specific to symptoms of stress incontinence, and five items specific to urge incontinence as well as the impact of these symptoms on their quality of life as assessed by the incontinence impact questionnaire-7 (IIQ-7).[8] This questionnaire yields a summed score ranging from 0 to 100 with higher scores indicating a greater degree of distress.

Student's t-tests and chi-square analysis were used to evaluate the association of DD with demographics, LUTS, bowel movement frequency, and perception of health status. Multivariable logistic regression was used to calculate odds ratios adjusted for age, household income, education, hysterectomy status, previous prolapse surgery, and self-perceived health status. P-values <0.05 were considered statistically significant. Stata (version 9.2, College Station, TX) was used for all analyses.

RESULTS

DD was reported by 10.4% (290/2,790) of women enrolled in the study. Women with DD were more likely than were those without to have three or fewer bowel movements per week (46.5% vs. 11.7%, adjusted OR: 5.8, 95% CI: 4.2−8.0). Fecal incontinence was not more likely to be experienced by women with DD compared to those without DD (18.8% vs. 13.4%, adjusted OR: 1.2, 95% CI: 0.81−1.8).

The demographic data of the women with and without DD are presented in Table I. Women with DD reported a higher mean number of comorbidities and were more likely than those without DD to be post-menopausal, to have had a hysterectomy or prolapse surgery, to have not completed the twelfth grade, to report an income of less than $25,000, and to report a self-perceived health status of "fair" or "poor." The groups did not differ with respect to age, mean parity, marital status, race, past incontinence surgery, or the use of estrogen replacement.

Lower urinary tract and bowel symptoms are reported in Table II. The constellation of symptoms commonly referred to as "dry" overactive bladder which includes urinary urgency, frequency, and nocturia was more common among women with DD. Women with DD were also more likely to have a sensation of incomplete emptying, dysuria, and urinary tract infections than were those without DD.

UI was common among women with DD. Subsets of women reporting symptoms were evaluated in a stepwise fashion based on severity of symptoms (Fig. 1). Women with DD were more likely than those without DD to report that they had experienced any UI (61.1% vs. 42.9%, adjusted OR: 2.4, 95% CI: 1.6−2.7). Among those reporting any UI, women with DD were also more likely than those without DD to report that they experienced "more than 12 episodes in the last year" (56% vs. 44%, adjusted OR: 1.6, 95% CI: 1.1−2.3). Those women who answered yes to both of these questions (n = 563) were further queried about symptoms of stress and urgency associated incontinence. Although the rates of specific symptoms did not differ (Table III), the perceived impact of these symptoms on quality of life was much greater among those with DD (mean IIQ-7 score ± SD: 33.5 ± 26.4 vs. 23.7 ± 23.8, $P = 0.004$). The incontinent group was also asked "how are you managing your incontinence?" In the DD group 9.56% indicated that they were taking medication (specific type not specified) and in the DD absent group 8.01% with P-value of 0.8.

TABLE I. Demographics, Health History, and Self-Perceived Health Status of Entire Cohort With or Without Difficult Defecation

Demographics/health	Difficult defecation (n = 2,500)	No difficult defecation (n = 290)	P-value
Age (years)	49.6	49.9	0.57
Mean parity	2.81	2.89	0.89
Education 12th grade or less completed	37.50%	28.76%	0.007
Household income <25K/year	30.05%	20.45%	0.017
Marital status—married	46.3%	48.5%	0.189
Race—African-American	65.97%	68.72%	0.343
Past hysterectomy	31.25%	21.65%	<0.001
History of prolapse surgery	7.64%	4.00%	0.004
History of incontinence surgery	3.13%	1.71%	0.094
Post-menopausal	61.75%	48.55%	<0.001
Estrogen replacement	14.04%	10.73%	0.093
Number of comorbidities ± SE (n = 2,733)	1.9 ± 0.1	1.4 ± 0.02	<0.001
Self-perceived health status (n = 2,750)			
Excellent to very good	31.3%	47.6%	0.04
Good	34.0%	35.1%	
Fair/poor	34.7%	17.3%	

TABLE II. Lower Urinary Tract Symptoms in Group With Difficult Defecation Compared to Those Without

| | Difficult defecation | | | |
	Present	Absent	Unadjusted OR* (95% CI)	Adjusted OR[a] (95% CI)
Lower urinary tract symptoms				
Frequent strong sudden urges to urinate (n = 2,739)	47.6%	29.2%	2.20 (1.71−2.81)	2.43 (1.79−3.31)
Nocturia episodes (n = 2,741)	1.8 ± 0.1	1.3 ± 0.02	1.32 (1.20−1.44)	1.31 (1.17−1.48)
Daytime urinary frequency episodes (n = 2,750)	8.2 ± 0.3	7.2 ± 0.1	1.06 (1.03−1.09)	1.06 (1.02−1.10)
Locate nearest toilet as soon as arriving at a new place (n = 2,739)	32.17%	18.7%	2.06 (1.58−2.67)	2.09 (1.51−2.91)
Dysuria (n = 2,750)	22.9%	13.7%	1.41 (1.12−1.79)	1.42 (1.04−1.94)
UTI in past year (n = 2,750)	18.8%	12.2%	1.67 (1.22−2.31)	1.64 (1.11−2.44)
Sense of incomplete emptying (n = 2,743)	55.6%	28.2%	3.19 (2.48−4.09)	3.31 (2.43−4.52)

Data presented are mean ± SE unless otherwise noted.
[a]Logistic regression controlling for age income education less than grade 12, history of hysterectomy, history of prolapse surgery.
*P < 0.004 for all values.

DISCUSSION

Women with symptoms of DD have an increased rate of bladder storage symptoms, consistent with the diagnosis of overactive bladder without incontinence, or so-called "dry OAB." They have more incontinence, but it is not specifically urgency or stress incontinence. These women also report more dysuria, urinary tract infections, and a sensation of incomplete emptying. Symptoms of UI are more common among women with DD, and these symptoms have a more negative impact on their quality of life as measured by the IIQ-7. This constellation of symptoms is similar, but not identical to pediatric DE.

Pediatric DE is characterized by the combination of bowel and bladder symptoms such as fecal incontinence, constipation, urinary tract infections (UTI), urgency, frequency, and UI. These symptoms together are called DE and are a well-known entity in pediatrics.[2] The root cause of these combined symptoms is felt to be primarily constipation. When constipation is successfully treated in children with DE, without any specific treatment for the urinary symptoms, 89% of the children are cured of daytime UI, 63% have disappearance of their of nighttime incontinence, and all anatomically normal children have disappearance of UTIs.[1] Empiric support such as this is not available in women but there is epidemiologic evidence to suggest that a constellation of symptoms similar to those seen in children can affect women.

A relationship between adult urogynecology patients and childhood DE has been established. Bower et al. surveyed 191 women attending an urogynecology clinic and 251 women attending other clinics about their current DE symptoms and those when they were children. There were significantly higher DE scores as children in women who were attending the urogynecology clinic and 41.7% of the UG women could be labeled as DE now. The authors concluded that a history of DE syndrome as a child results in more bowel and bladder problems as an adult.[6] Minassian et al. found similar results when they surveyed 170 women attending gynecology clinics. The women who reported a history of childhood DE currently had more urinary frequency, urgency, SUI, and UUI.[5]

There is also the possibility that DE syndrome that occurs in children is a completely different disorder altogether than the constellation of symptoms present in our adult population. In the few articles that address both bowel and bladder disorders together, symptoms of OAB and anal incontinence or constipation were found to overlap significantly, but the main risk factor for these combined symptoms was uterovaginal prolapse.[9] It has been reported that 10–40% of women with anorectal incontinence have SUI or prolapse.[10,11] However, in this analysis the difference in bladder symptoms held true when controlling for prolapse in the logistic regression.

The question arises: what about DD, or difficulty emptying stool from the rectum, could possibly cause overactive bladder symptoms combined with other LUTS? Rectal distention from a stool bolus is the normal stimulus for defecation. If evacuation is delayed one has to contract the external sphincter and puborectalis to cause the fecal urgency to subside until the next fecal bolus arrives. Over time, if this behavior of maintaining chronic anal sphincter tone persists, the rectum gets over distended and the pelvic floor becomes hypertonic and this may persist. This is referred to as fecal hoarding in children and is felt to be a major contributor to childhood OAB symptoms.[12]

If the rectum does not empty well the fecal mass that is stored in the rectum and sigmoid may exert pressure on the bladder wall, decreasing functional bladder capacity like a gravid uterus compresses the bladder during pregnancy leading to overactive bladder symptoms[13] or that the stretch receptors in the bladder wall are stimulated by the fecal mass triggering uninhibited detrusor contractions.[12,14] It is also possible that colonic contractions may trigger detrusor contractions through a shared neurological pathway in the
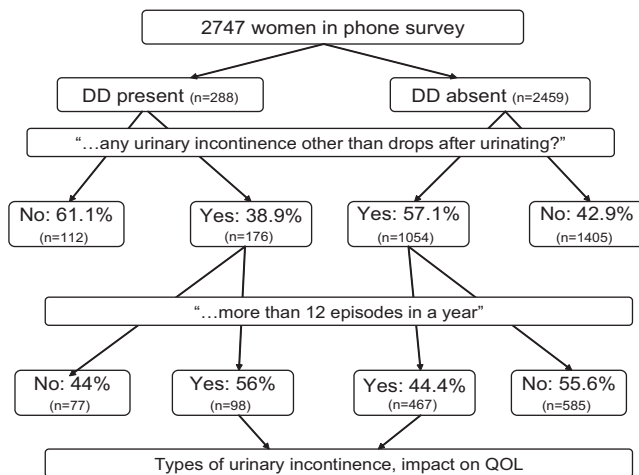

Fig. 1. Difficult defecation (DD) and urinary incontinence inclusion groups.

TABLE III. Urinary Incontinence Symptoms Among Women Who Have >12 Urinary Incontinence Episodes Per Year (n = 563)

| | Difficult defecation (%) | | |
Urinary incontinence	Yes	No	*P*-value
SUI: with cough/laugh/sneeze	49.5	48.4	0.9
SUI: with lifting	9.2	10.4	0.3
SUI: straining	7.2	9.1	0.06
SUI: exercise	9.3	11.9	0.5
SUI: sexual incontinence	2.1	4.1	0.5
UUI: when you have a cold	9.3	6.0	0.4
UUI: when you put keys in lock	18.6	21.6	0.9
UUI: hearing water run	12.4	13.3	0.8
UUI: with little warning	25.8	23.4	0.2
UUI: can't find toilet	23.7	14.8	0.2

SUI, stress urinary incontinence; UUI, urgency urinary incontinence.

spinal cord or pelvic nerves.[15]This has also been seen in an animal model where colonic contractions from acute colitis increases voiding symptoms in rats.[16,17]

There may be a central nervous system alteration that is responsible for these combined bowel and bladder symptoms. Afferent nerves in the sigmoid, rectum, and bladder all send information to the spinal cord via the pelvic nerve and pelvic parasympathetic nerves mediate both bowel and bladder emptying. Therefore, an afferent neural pathway disorder could explain the combined hypersensitive bowel and bladder occurring together. Sacral nerve stimulation has had good success in treating both urgency and frequency symptoms as well as chronic defecation disorders, despite identical placement of the stimulation lead in the S3 foramina for both indications. Therefore, this theory of a common neurological pathway is plausible.[18]

Many other genitourinary symptoms have been shown to overlap in a similar fashion as the bowel and bladder symptoms in this analysis. Bladder symptoms that define interstitial cystitis/painful bladder syndrome (IC/PBS) and bladder outlet obstruction have been shown to overlap and exist together more frequently than would be expected by chance in the Boston Area Community Health Survey. This survey queried over 3,000 racially diverse community dwelling women and found that 0.5% of the women reported pure symptoms of IC/PBS, 11.4% reported pure obstructive-type symptoms, and 1.1% reported both, making the overlap of symptoms more than twice as prevalent as pure IC/PBS symptoms.[19]

There are several factors that should be kept in mind in interpreting the results of this analysis. This group of women was recruited from women 35 to 64 years of age in a small geographical area in Michigan. The generalizability of the results to women of other ages or living in other parts of North America remains to be defined. Also no Latina or Asian-American women were recruited so these results cannot be applied to these populations. This study was not designed to measure defecatory dysfunction specifically, and a more complete bowel questionnaire is needed to fully evaluate these symptoms. Our hypothesis that this disorder may be related to childhood DE is not assessable since childhood elimination symptoms were not asked of this population.

This association between bowel and bladder symptoms in women has clinical implications. It is well known that treatment of these bowel symptoms in children dramatically reduces urinary infections and UI.[20] The treatment of these

bowel symptoms in women could potentially be equally efficacious. It is our suggestion that all women with OAB symptoms should be queried about their bowel symptoms and any defecatory dysfunction addressed simultaneously with the OAB due to their probable interrelation. Unfortunately, the mainstay of pharmacological treatment for OAB is antimuscarinic agents who have the potential side effect of constipation in approximately 7%.[21] Further study needs to be done to confirm that treatment of the bowel symptoms in the adult female will improve their bladder symptoms if these measures are certainly not harmful and are potentially beneficial not only to the bowel, but to bladder symptoms.

CONCLUSION

Women with symptoms of defecatory dysfunction have an increased rate of bladder storage symptoms, consistent with the diagnosis of overactive bladder without urge incontinence, or dry OAB. Understanding the pathophysiology underlying this association and exploring treatment options that address these combined symptoms is worthy of future research.

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