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## Obstructive Defecation in Middle-Aged Women

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### Abstract

Obstructive defecation, a significant contributor to constipation, is frequently reported in middle-aged women, yet few population-based studies have established prevalence in this group. We analyzed data from the Reproductive Risks for Incontinence Study at Kaiser, a population-based cohort of racially diverse women, 40–69 years old, to describe the prevalence of obstructive defecation and identify associated risk factors. The Reproductive Risks for Incontinence Study at Kaiser is a randomly selected cohort of 2,109 women in the Kaiser Medical System. Obstructive defecation, determined by self-report, was defined as difficulty in passing stool, hard stool, straining for more than 15 min, or incomplete evacuation, occurring at least weekly. Age, race, income, education, drinking, health status, parity, pelvic organ prolapse, urinary incontinence, number of medications, hysterectomy, surgery for pelvic organ prolapse, colectomy, irritable bowel syndrome, and body mass index were assessed for both their univariate and multivariate association with obstructive defecation. Multivariate logistic regression was used to determine the independent association between associated factors and the primary outcome of obstructive defecation. Obstructive defecation that occurred at least weekly was reported by 12.3% of women. Significant independent risk factors included irritable bowel syndrome [odds ratio 1.78, (95% confidence interval 1.21–2.60)], vaginal or laparoscopic hysterectomy [2.01 (1.15–3.54)], unemployment [2.33 (1.39–3.92)], using three or more medications [1.81 (1.36–2.42)], symptomatic pelvic organ prolapse [2.34 (1.47–3.71)], urinary incontinence surgery [2.52 (1.29–4.90)], and other pelvic surgery [1.35 (1.03–1.78)]. We concluded that obstructive defecation is common in middle-aged women, especially those with a history of treatment for pelvic floor

conditions. Women who had undergone laparoscopic/vaginal hysterectomies or surgery for pelvic organ prolapse or urinary incontinence had a nearly two times greater risk of weekly obstructive defecation. Demographic factors, with the exception of employment status, were not significant, indicating that obstructive defecation, although widespread, does not affect any particular group of women.

## Keywords

Constipation; Obstructive defecation; Epidemiology; Risk factors; Prevalence

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## Introduction

Constipation is a common problem in women [1–5]. Women with constipation are more likely than men to seek medical attention or use medication for this condition [3,6]. Limited numbers of studies examining the prevalence and risk factors for this condition, as well as its impact on quality of life, have been performed. Functional constipation is considered a symptom-based disorder that is characterized by both decreased frequency and hard consistency of stools, as well as symptoms relating to difficult evacuation [7]. The impact of obstructive defecation on constipation is not well understood, but it contributes to the morbidity of this condition and cost to both the patient and society in terms of medications, aids purchased, and loss of work days [8–10].

The prevalence of constipation in the United States of America is reported to be 2–30% [3–5,11,12]. The reporting of prevalence is hindered by the lack of clear criteria for constipation. Constipation is a heterogeneous condition with several subtypes that include obstructive defecation, slow colonic transit, and associated irritable bowel syndrome (IBS). Furthermore, people may have a combination of symptoms that make it difficult to categorize them as having any one subtype. A recent survey of bowel habits in women has demonstrated that the range of what is perceived as normal frequency or consistency of stools also varies considerably [13] and, thus, the measure of frequency and consistency alone to define constipation is not adequate. Previous reports have established that women are more than twice as likely as men to report constipation, especially when self-report measures are used instead of the stricter clinical consensus Rome criteria [3,5,14]. The discrepancy in prevalence rates based on clinical criteria for constipation versus those determined by self-report is not well understood. Furthermore, the impact of obstructive defecation symptoms on the severity of constipation has not been examined, and, thus, the true prevalence of obstructive defecation is not known.

Risk factors and associated quality of life have also not been well defined. In women, conflicting evidence exists regarding the importance of age, weight, obstetric history, pelvic surgery and other medical conditions associated with constipation [15–17]. Quality of life has been reported to be worse in women with constipation [18]. The assessment of constipation-related quality of life has been hindered by the lack of a reliable and validated measurement tool.

We examined a racially diverse, population-based, cohort of middle-aged and older women to estimate the prevalence of obstructive defecation by frequency and impact on quality of life. In addition, we sought to identify independent risk factors associated with obstructive defecation in these women.

## Patients and Methods

### Patients

The study cohort included 2,109 community-dwelling women who were enrolled in the Reproductive Risks for Incontinence Study at Kaiser (RRISK) from October 1999 to February 2003. This population-based, racially diverse, cohort was constructed by the identification of women between 40 and 69 years of age who had been members of the Kaiser Permanente Medical Care Program of Northern California (KPMCP) since the age of 18 years. This program is a large integrated health care delivery system with over 3 million members that serves approximately 25% of the population in the area. Members of KPMCP have been shown to be very similar to the population in the geographic area served with respect to all other demographic characteristics [19].

A sample of 10,230 women was randomly selected within age and race strata from a group of approximately 66,000 long-term female members. The objective was to obtain approximately equal numbers of women in each 5-year age group with a race/ethnicity composition of 20% African-American, 20% Latina, 20% Asian-American and 40% white (non-Hispanic). Details of the determination of eligibility and the recruitment have been separately reported [20].

### Methods

Self-report questionnaires were used to obtain data on obstructive defecation. It was assessed by the question “During the last 12 months, how often have you experienced difficulty passing stool (bowel movements), having to sit on the commode (toilet) for more than 15 min, hard stools (bowel movements), or a sense of incomplete bowel movements (constipation)?” Frequency was reported as daily, weekly, monthly, less than monthly or never in the past year. We chose to use obstructive defecation that occurred weekly or more often as our primary outcome because it is clinically significant and the number of women with daily symptoms was small ( $n = 52$ ).

Factors potentially associated with constipation were collected via questionnaires, interviews, medical record review, and physical examination. Participants completed an in-person interview with a structured questionnaire that included questions on age, race/ethnicity, demographic characteristics (education, employment and income level), reproductive and menopause history (parity, menopausal status, current oral use of estrogen), presence of selected medical conditions (diabetes, chronic obstructive pulmonary disease, stroke, irritable bowel syndrome, and inflammatory bowel disease), health habits (tobacco use, alcohol use), prior surgeries [type of hysterectomy, pelvic organ prolapse repair, appendectomy, colectomy, surgery for urinary incontinence (UI) or pelvic organ prolapse (POP; i.e., for cystocele, rectocele, uterine or vaginal prolapse)], and general health status. Pelvic floor symptoms were assessed by self-report of urinary incontinence (“During the last 12 months, have you leaked urine, even a small amount?”) or pelvic organ prolapse [ever having “dropped or prolapsed female/pelvic organs (bladder, uterus, vagina, rectum)"]. Quality of life was assessed by the short-form 36-item health survey (SF-36) from which a standardized mental component scale (SF-36 MCS) and physical component scale (SF-36 PCS) were calculated [21]. Body mass index (BMI) was calculated (in kilograms per square meter) based on the participant’s weight and height measured at the time of the interview. Method of delivery (vaginal or cesarean section) was abstracted from review of labor and delivery and surgical medical records archived since 1946 and categorized as none, cesarean section only, or one or more vaginal delivery.

## Data Analysis

We presented the frequency of obstructive defecation as the number and percent of patients reporting “None”, “Less than monthly”, “Monthly”, “Weekly” or “Daily” symptoms. We compared demographic and clinical characteristics of patients with weekly or greater symptoms with those who had monthly or less obstructive defecation, using chi-square tests and chi-square tests for trend for ordinal variables with three or more levels.

To determine the independent associations between risk factors identified a priori and obstructive defecation, we used multivariate logistic regression models to control for potential confounding variables. Variables associated ( $P < 0.2$ ) with weekly or more frequent obstructive defecation in univariate models that remained significant at this level after adjustment were retained in the final multivariate models. Age was force-entered into the multivariate model. Results are presented as odds ratios (ORs) and 95% confidence intervals (95% CIs). Multivariable linear models using analogous criteria for the selection of covariates were used to assess constipation frequency as a predictor of quality of life, assessed by scores on the SF-36 MCS and PCS scales. Results of this model are presented as adjusted and unadjusted mean scores for each frequency category, with 95% CIs. All analyses were carried out in SAS version 9.1 (SAS Institute, Cary, NC, USA).

## Results

Nearly 60% of the 2,109 women in this cohort reported some obstructive defecation in the previous 12 months. Daily, weekly, monthly and less than monthly obstructive defecation was reported by 52 (2%), 207(10%), 278 (13%), and 706 (34%) women, respectively. Weekly or more frequent obstructive defecation, which was used as our outcome variable of interest, was reported by 259 women (12.3%). Table 1 presents the baseline demographic and medical characteristics of the sample. This cohort of women had a mean ( $\pm$  standard deviation) age of  $55.9 \pm 8.6$  years. Forty-eight percent were white, 18% African-American, 17% Latina and 16% Asian. Fewer than 10% of the population had diabetes, chronic obstructive pulmonary disease (COPD), stroke, inflammatory bowel disease (IBD) or any cancer history. Ten percent of the population had IBS. Twenty-three percent of women had undergone a hysterectomy; 75% of women had experienced at least one vaginal delivery, 29% reported at least weekly urinary incontinence, and 8% reported pelvic organ prolapse.

Several demographic and medical variables were significantly associated with weekly or more frequent obstructive defecation. Women who had at least weekly symptoms were more likely to be unemployed, report fair or poor health, consume less alcohol weekly, be postmenopausal, have urinary incontinence or pelvic organ prolapse, prior hysterectomy, colectomy, appendectomy or surgery for urinary incontinence or pelvic organ prolapse, and take more medications.

All variables associated with obstructive defecation ( $P < 0.2$ ; Table 1) in univariate analyses were included in a multivariate model comparing women reporting at least weekly obstructive defecation in the past year to those with monthly or less obstructive defecation (Table 2). Factors independently associated with a higher prevalence of obstructive defecation in the past year were irritable bowel syndrome (1.8-fold increase), vaginal or laparoscopic hysterectomy (twofold increase), unemployment (2.3-fold increase), taking more than three medications (1.8-fold increase), pelvic surgery (1.4-fold increase), symptomatic pelvic organ prolapse (2.3-fold increase) and urinary incontinence surgery (2.5-fold increase). Age, race, income, education, health status, BMI, COPD, stroke, reproductive history, menopausal status, inflammatory bowel disease, urinary tract infections, pelvic organ prolapse surgery, colectomy, and appendectomy were not independently associated with the reporting of obstructive defecation in the past year.

Frequency of obstructive defecation was significantly associated with women's self-reported quality of life (Table 3). Specifically, in the unadjusted models, more frequent obstructive defecation was associated with lower SF-36 scores for the mental health component scale (MCS;  $P < 0.001$ ) and for the physical health component scale (PCS;  $P < 0.001$ ). Once the model had been adjusted for variables significantly associated with MCS and PCS scores, more frequent constipation remained significantly associated with the MCS ( $P < 0.001$ ). However, the relationship between obstructive defecation frequency and the PCS was only marginally significant in the adjusted model ( $P < 0.06$ ).

## Discussion

In this cohort of middle-aged and older women, almost two-thirds reported obstructive defecation at least once in the past year. Symptoms that occurred weekly or more often was reported by 12% of the cohort, which is consistent with, albeit at the lower end of, the overall prevalence of constipation reported in other population-based studies of women [1,3,4]. In this study, we asked women to define their constipation symptoms based primarily on symptoms of obstructive defecation, which is known to be more common than infrequent stools in women [4,14,17,22]. This assessment strategy may have resulted in a lower estimated prevalence of constipation in our cohort than in other studies that used a broader definition. However, since constipation is known to be characterized by a range of symptoms, further investigation is needed about which characteristics contribute most prominently to a person's perception of their constipation.

We identified several risk factors that were independently associated with obstructive defecation occurring at least weekly. These included employment status, symptoms of pelvic organ prolapse, gynecologic or pelvic surgery, use of three or more medications, and IBS. Women who were unemployed had a more than two times greater odds of reporting obstructive defecation. The importance of this finding is unclear, although it is possible that a lower socioeconomic status may affect diet, physical activity and other lifestyle factors that are known to affect constipation [15].

In our population-based study, women with symptomatic pelvic organ prolapse were two times more likely to report symptoms of obstructive defecation. Prior studies of concurrent constipation and pelvic organ prolapse in specialty clinic (urogynecology or gastroenterology) populations have produced contradictory conclusions. A fourfold increased odds of constipation was noted in one study of women with pelvic organ prolapse [23], while other studies have shown no association between pelvic organ prolapse and constipation [16,24]. Clearly, more longitudinal studies are required to assess the causal relationship of these two conditions. It is unclear whether chronic constipation and straining predispose patients to develop pelvic organ prolapse, or if the presence of pelvic organ prolapse exacerbates obstructive defecation by causing rectal outlet obstruction due to rectoceles, rectal prolapse and intussusception, or even pelvic floor dyssynergia.

The effect of hysterectomy on constipation has also been examined, with variable results. One prospective study found no increase in constipation symptoms after abdominal or vaginal hysterectomies for benign conditions [25], and another cross-sectional study of hysterectomy and painless constipation found no significant association [26]. However, a fourfold increased odds of obstructive defecation was noted in patients recruited from a gastroenterology clinic who had a history of hysterectomy. [16]. Our study found that the odds of obstructive defecation increased twofold when women had a history of vaginal or laparoscopic hysterectomy, whereas abdominal hysterectomy did not confer any additional risk. This finding is noteworthy in that bowel habits have not been investigated in studies comparing abdominal, vaginal and laparoscopic hysterectomy approaches [27,28].

Additional studies of changes in bowel function after vaginal and laparoscopic hysterectomy are needed to assess their individual contributions to constipation. In a similar vein, we demonstrated an increased odds of obstructive defecation in women who had undergone surgery for urinary incontinence or other pelvic surgery that did not include hysterectomy. There are no existing data about the causal effect of this type of surgery on constipation, but an increased odds of chronic constipation has been demonstrated in women with mixed and stress urinary incontinence [29].

Our study also demonstrated the independent association of irritable bowel syndrome with obstructive defecation. IBS is characterized by constipation, diarrhea or alternating bowel habits. Similarly, we confirmed an independent association of fecal incontinence and IBS in a previous study [30]. However, the risk of constipation with increasing number of medications has not been reliably demonstrated in other studies. In an investigation of over 60,000 women in the Nurses' Health Study who were asked about their bowel habits, constipation was defined as having less than two bowel movements per week. The authors reported that the number of medications used was not significantly associated with constipation. However, in a separate study of risk factors in 14,000 patients diagnosed with constipation compared with 7,000 controls, a more detailed analysis of medications, based on class of drugs, demonstrated an increased risk of constipation with the use of opioids, diuretics, antidepressants, antihistamines, antispasmodics, anticonvulsants and aluminum antacids [17]. Because many constipated patients may be using medication to ameliorate their condition, examining specific types of medications, as opposed to the number, may be more useful in understanding the relationship between constipation and medication usage.

Although reported as risk factors in other studies [15,17], age and increased weight were not significant in our cohort of women. Our racially diverse population also provided a unique opportunity for us to examine racial differences in constipation, which has not previously been examined. However, we did not find any significant associations of race and obstructive defecation.

Obstructive defecation was also independently associated with a diminished general quality of life as measured by the SF-36, with a greater impact on mental health than on physical health. The importance of assessing constipation-related quality of life has become increasingly evident, especially when specific criteria that define constipation do not reflect the perceptions of those being evaluated. Few studies have actually examined the effect of constipation on quality of life. Two studies using the Rome criteria to identify functional constipation also found a significant decrease in the physical and mental component scores of patients with constipation compared to those without symptoms [18,31]. However, our study is the first to adjust the analyses of quality of life for other medical conditions that may have confounded the results. This may explain why the effect of obstructive defecation on the physical component score was not significant after adjustment for these variables. However, the use of adjusted quality of life scores provides a more accurate representation of the specific effect of obstructive defecation on quality of life, which is similar to what a constipation-related quality of life measure would accomplish.

Our study had several limitations that should be considered when one is interpreting the results. First, this was a cross-sectional study that could not determine the incidence of obstructive defecation or causal associations. Second, as in previous large epidemiological studies, obstructive defecation was defined by self-report without using consensus criteria for functional constipation, obstructive defecation or irritable bowel syndrome, or specifying many of the characteristics that might have helped to define severity. As this study was designed to examine risk factors for urinary incontinence, questions about bowel habits and associated symptoms of constipation were limited and thus made it difficult to define

subtypes of constipation. However, at the time of this study, no widely used, validated and reliable instrument was available to evaluate the severity of constipation. Lack of such an instrument has had a significant impact on research in this field. Consensus criteria, such as the Rome II, which are commonly used to assess constipation, can identify subtypes of constipation but do not determine severity of symptoms [32,33]. In addition, the Rome criteria do not capture all people who consider themselves constipated by self-report measures [5]. Quality of life has been measured by the SF-36, a commonly used instrument [34] that is not specific to constipation. Only recently has a constipation-specific quality of life measure been developed [35]. Finally, our cohort was made up of generally healthy, community-dwelling women who had been Kaiser members since age 18 years. They were found to be similar to all women members of the same age with respect to several characteristics, including the number of office visits in the past 27 months to gynecology, urology, and family practice/internal medicine clinics, prior hysterectomies and use of hormone replacement therapy. However, other potential differences in our cohort should be considered when one is generalizing our results to other populations.

In summary, obstructive defecation is a common problem in women that has a significant impact on overall quality of life. Women are at increased risk for this condition as they are more likely to have IBS, pelvic organ prolapse, and pelvic surgery. Health care providers should be aware that the anterior and posterior compartments of the pelvis might have a more integrated relationship than previously noted and, thus, should conduct a more comprehensive evaluation in patients presenting with urinary or vaginal complaints.

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**Table 1**Baseline characteristics of RRISK cohort and by frequency of obstructive defecation  $n = 2,109$ 

<b>Risk factor</b>	<b>≥Weekly <i>n</i> (%)</b>	<b>≤Monthly <i>n</i> (%)</b>	<b><i>P</i></b>
Number	259	1,845	
Age in years, mean ± SD	56 ± 9	56 ± 9	0.30
Categorical age (years)			0.32
40–49	65 (11)	532 (89)	
50–59	97 (12)	699 (88)	
≥60	97 (14)	614 (86)	
Race			0.42
Caucasian	133 (13)	868 (87)	
African-American	46 (12)	336 (88)	
Asian	32 (9)	312 (91)	
Hispanic	44 (13)	305 (87)	
Native American/Other	4 (14)	24 (86)	
Education			0.16
High School or less	60 (14)	360 (86)	
Some college or more	198 (12)	1485 (88)	
Job status			0.001
Employed/student	149 (11)	1217 (89)	
Unemployed/others	23 (24)	74 (76)	
Retired	64 (13)	436 (87)	
Homemaker	22 (16)	117 (84)	
Income			0.11
<\$40,000	69 (15)	401 (85)	
\$40,000–\$79,999	104 (12)	740 (88)	
≥ 80,000	66 (10)	565 (90)	
Health conditions & habits			
Health status			<0.001
Excellent	30 (8)	331 (92)	
Very good/good	178 (12)	1322 (88)	
Fair/poor	51 (21)	192 (79)	
COPD	22 (18)	101 (82)	0.05
Stroke	11 (22)	40 (78)	0.04
Irritable bowel syndrome	47 (23)	157 (77)	<0.001
Current alcohol use (≥1 drink/week)	51 (9)	494 (91)	0.01
Drinks now in typical week			0.03
<1 drink/week	107 (14)	634 (86)	
1–4 drinks/week	40 (11)	321 (89)	
>4 drinks/week	11 (6)	174 (94)	
Reproductive history			
Parity/delivery type			0.17

<b>Risk factor</b>	<b>≥Weekly n (%)</b>	<b>≤Monthly n (%)</b>	<b>P</b>
None	39 (10)	346 (90)	
C-section only	11 (9)	105 (91)	
At least 1 vaginal	200 (13)	1321 (87)	
Postmenopausal	186 (14)	1190 (86)	0.03
Current estrogen use	90 (14)	560 (86)	0.15
Pelvic floor dysfunction			
≥Weekly urinary incontinence	97 (16)	505 (84)	<0.001
Pelvic organ prolapse last 12 months	30 (26)	87(74)	<0.001
Visible vaginal bulging last 12 months	13 (23)	44 (77)	0.01
Surgery			
Hysterectomy	80 (17)	394 (83)	<0.001
Hysterectomy type			<0.001
No hysterectomy	179 (11)	1451 (89)	
Abdominal	59 (15)	326 (85)	
Vaginal	19 (23)	62 (77)	
Laparoscopic	2 (29)	5 (71)	
Other pelvic surgery	143 (15)	837 (85)	0.003
Pelvic organ prolapse surgery	21 (28)	54 (72)	<0.001
Colon surgery	19 (24)	59 (76)	<0.001
Appendectomy	62 (16)	315 (84)	0.007
Urinary incontinence surgery	16 (32)	34 (68)	<0.001
Number of medications			
Mean ± SD	3 ± 3	2 ± 2	<0.0001
0	43 (9)	462 (91)	<0.001
1	40 (10)	345 (90)	
2	34 (9)	353 (91)	
3 or more	142 (17)	685 (83)	

**Table 2**

Multivariate analysis of factors associated with weekly or more frequent obstructive defecation

Odds ratio	Odds ratio (95% CI)	<i>P</i>
Age (per year)	0.99 (0.97–1.01)	0.53
Irritable bowel syndrome	1.78 (1.21–2.60)	0.003
Drink alcohol ( $\geq 1$ drink per week)	0.76 (0.54–1.06)	0.09
Hysterectomy		0.05
No hysterectomy	Reference	
Abdominal	1.13 (0.80–1.59)	
Vaginal/laparoscopic	2.01 (1.15–3.54)	
Job status versus employed		0.01
Employed	Reference	
Unemployed/other	2.33 (1.39–3.92)	
Retired	1.07 (0.72–1.61)	
Homemaker	1.38 (0.82–2.31)	
Taking three or more different medications	1.81 (1.36–2.42)	<0.001
Other pelvic surgery	1.35 (1.03–1.78)	0.03
Symptomatic pelvic organ prolapse	2.34 (1.47–3.71)	<0.001
Urinary incontinence surgery	2.52 (1.29–4.90)	0.007

**Table 3**

Adjusted and unadjusted SF-36 physical component score (PCS) and mental component score (MCS) by obstructive defecation frequency

Parameter	Overall (n = 2104)	≥Weekly (n = 259)	≤Monthly (n = 1845)	P
MCS adjusted <sup>a</sup>	44.6 (44.3, 44.8)	43.3 (42.6, 44.0)	44.7 (44.5, 45)	<0.001
MCS unadjusted	44.5 (44.2, 44.7)	42.8 (42.0, 43.7)	44.7 (44.4, 45)	<0.001
PCS adjusted <sup>b</sup>	46.0 (45.9, 46.2)	45.4 (44.7, 46.1)	46.1 (45.9, 46.3)	0.06
PCS unadjusted	46.0 (45.7, 46.3)	44.2 (43.3, 45.1)	46.3 (46.0, 46.5)	<0.001

<sup>a</sup> Adjusted for age, income, body mass index, self-reported health status, irritable bowel syndrome, current smoker, menopause status, ≥weekly urinary incontinence, pelvic organ prolapse, pelvic organ prolapse surgery and urinary tract infection in the last 12 months

<sup>b</sup> Adjusted for age, race, education, job status, income, body mass index, self-reported health status, diabetes, chronic obstructive pulmonary disease, irritable bowel syndrome, more than one alcoholic beverage per week, ≥weekly urinary incontinence, visible pelvic floor bulging in the last 12 months, urinary tract infection in last 12 months, pelvic organ prolapse surgery and cholecystectomy