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The Differential Impact of Flatal Incontinence in Women With Anal Versus Fecal Incontinence

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Abstract

Objectives—The differential impact on quality of life (QOL) that leakage of both stool and flatus confers on women compared to stool only is unclear. Our aim was to characterize differences in symptom distress, impact on QOL, and anorectal testing among women with leakage of stool and flatus, stool only, and flatus only.

Methods—A retrospective review was conducted of women undergoing evaluation of at least monthly bowel incontinence symptoms. Subjects were divided into 3 groups: liquid/solid stool and flatus (anal incontinence, AI); liquid/solid stool only (fecal incontinence, FI); and flatal only (FL). Baseline assessment included the Modified Manchester Health Questionnaire (MMHQ) including the Fecal Incontinence Severity Index (FISI), Short Form-12 (SF-12), as well as anorectal manometry and endoanal ultrasound evaluations.

Results—Of 436 subjects, 381 had AI, 45 FI, and 10 FL. Significant between-group differences were noted in MMHQ ($p=0.0002$) and FISI total scores ($p<0.0001$) where women with AI reflected greater negative impact than women with FI. The SF-12 (PCS, MCS) scores were similar in all three groups ($p=0.22, 0.08$). Resting/squeeze pressures were significantly lower in AI and FI groups compared to FL ($p=0.0004$), whereas rectal capacity was similar in all three groups. Although exploratory, MMHQ scores were similar between FI and FL groups, although FISI scores were higher in the FI group ($p<0.0001$).

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Conclusions—Women with AI have higher symptom specific distress and greater negative impact on QOL compared to women with FI. Treatment of all bowel incontinence symptoms is important to improve symptom-specific and general QOL.

Keywords

Anal incontinence; Fecal incontinence; Accidental bowel leakage; Flatal incontinence; Quality of life

Introduction

Anal incontinence (AI), defined as the involuntary leakage of gas, mucous, liquid, and/or solid stool, is a physically and psychologically devastating condition which negatively impacts quality of life (QOL).^{1,2} Fecal incontinence (FI) is defined as leakage of either liquid or solid stool only (without flatus).³⁻¹⁰ A recent study reported that the most women prefer the term accidental bowel leakage (ABL) to describe these conditions.^{11,12} The prevalence of anal or fecal incontinence varies widely from 2 to 24 % of the US population, depending on the population being queried and the definition of the condition.^{3,4,7,9,13-16} Despite its severe impact on both patients and society, the majority of women with anal or fecal incontinence do not seek care.^{9,17} While studies have demonstrated the etiology, impact, and risk factors of AI, such as age, parity, obesity, mode of delivery, impaired mobility, comorbid diseases, and stool consistency,^{10,13,18-20} most existing studies focus solely on FI only.

The most common type of bowel leakage is thought to be flatal incontinence only (FL), and its prevalence has been reported substantially higher than stool leakage.^{3,9,19,21} According to previous investigations, whether leakage of gas has less impact on QOL is controversial^{9,21,22} and limited data exist on this issue.^{21,22} Thus, the differential impact on QOL that flatal incontinence confers in women with AI compared to women with leakage of stool only remains unclear.

The primary aim of this study was to characterize differences in symptom distress, impact on QOL, and baseline anorectal diagnostic testing findings between women with AI to women with FI. As an exploratory aim, we also compared characteristics of women with flatal incontinence only to those with FI.

Materials and Methods

Women undergoing evaluation of AI, FI and FL between 2003 and 2013 Genito-Rectal Disorders Clinic at the University of Alabama at Birmingham were eligible for this retrospective cohort study. This study received IRB approval, and all participants provided written informed consent. Demographic and medical history data were collected on each patient including: age, race, smoking behavior, hypertension, pulmonary disease, diabetes, prior colorectal surgery, hysterectomy, and history of sphincter disruption. Participants completed validated questionnaires rating symptom specific distress, impact and general QOL measures, including the Modified Manchester Questionnaire (MMHQ, range 0-100) which includes the Fecal Incontinence Severity Index (FISI, range 0-61), and the Short

Form-12 (SF-12, range 0-100) including the mental and physical component summary scores (MCS and PCS), respectively.^{1,23,24} Participants were included in the study if they had evidence of bowel incontinence demonstrated by a positive response to leakage of gas, liquid or solid stool at least once a month using the MMHQ. The subjects were divided into three groups; the AI group comprised women with liquid/solid stool and flatal incontinence, the FI group comprised women with liquid/solid stool incontinence (no flatal incontinence), and the FL group of women with flatal incontinence only. All participants underwent baseline anorectal manometry (ARM) measures (resting sphincter tone, sphincter squeeze pressure, and rectal capacity) and endoanal ultrasonography characterizing whether the external and internal sphincters were intact.

The primary aim was to characterize differences in clinical and demographic characteristics as well as symptom distress and impact on QOL in women with AI compared to women with FI. A global comparative analysis across the 3 groups was also performed. Comparisons involving women with only flatal incontinence were also of interest, but were limited by a small sample size. Thus, analyses involving the flatal only group were investigated as exploratory only.

For comparisons of patient characteristics and questionnaire outcomes among groups, chi-square and Fisher's exact tests were used for categorical measures, as appropriate. Two sample t-tests and Wilcoxon rank-sum tests were used for continuous measures. For comparisons across all 3 study groups, chi-square tests of association were used for categorical measures and one-way analysis of variance (ANOVA) were used for continuous measures. When distributional assumptions for these methods were not met, Pearson exact tests and Kruskal-Wallis tests were used. Statistical significance was evaluated at 0.001 to account for multiple comparisons. Statistical analyses were conducted using SAS version 9.3 (SAS Institute, Inc., Cary, NC).

Results

Four hundred thirty-six eligible subjects were included in the analysis: 381 subjects with AI, 45 with FI, and 10 FL. Overall, participants were predominantly White (87%) and had a mean age of 57 ± 14 years. The clinical and demographic characteristics were similar among all 3 groups (Table 1).

When comparing bowel symptoms in the AI to the FI group, there were significant differences noted in symptom-specific distress and impact with respect to baseline MMHQ total scores ($p = 0.0002$), the role limitation subscale of MMHQ ($p = 0.0007$) and FISFI scores ($p < 0.0001$), women having AI being more impacted (Table 2). The PCS subscale score of the SF-12 did not differ between the 2 groups ($p = 0.27$), whereas the MCS subscale score trended lower in women with AI ($p = 0.03$), though not statistically significant at the 0.001 level.

Despite the limited sample size, we characterized differences in women with FI to those with flatal incontinence only as an exploratory aim. Women with flatal incontinence only were significantly younger (mean 46 vs. 61, $p = 0.001$). Although the FISFI total score was

higher in women with FI ($p < 0.0001$), there were no differences in either the total or the individual subscale scores of the MMHQ between women with FI and those with flatal incontinence only. The SF-12 (PCS and MCS) scores were also similar between the FI only and flatal only groups ($p = 0.45, 0.26$, respectively).

Women with AI and FI had significantly lower resting and squeeze pressures (global $p = 0.0004$ and 0.001 , respectively) compared to those with FL, whereas rectal capacity was similar in all three groups (global $p = 0.54$, Table 3). There were no differences in the rates of external and internal sphincter defects (global $p = 0.05$ and 0.39 , respectively).

Discussion

Anal incontinence is a physically and psychosocially debilitating condition. In this study, women with AI have greater symptom specific distress as well as greater negative impact on QOL compared to women with FI as measured by the FIS and MMHQ. These findings bring up an interesting insight that having flatal leakage can add a significant impact to QOL to the already bothersome FI.

In comparison, findings noted comparing women with FI and flatus only as an exploratory aim revealed no difference in the disease specific QOL measures (MMHQ total and all subscales), although the incontinence severity score was lower in women with flatal incontinence only. Although exploratory, this suggests that the burden of flatal incontinence carries similar weight to that of stool leakage. This finding is consistent with existing data that women's QOL is still highly affected by their bowel symptoms even when their incontinence severity index scores may be lower.³¹

The SF-12 was designed to measure general health status with a high score indicating better physical functioning with a mean of 50 and a standard deviation (SD) of 10 in a representative sample of the US population.^{32,33} Our study demonstrated that women with bowel incontinence, regardless of the type of leakage, scored lower than 50 on both PCS and MCS. Although not statistically significant at a 0.001 level of significance, the mean MCS score was lower in the AI group compared to the FI group (41.2 ± 12.4 vs. 45.7 ± 12.3 , $p = 0.03$, Table 2). The addition of flatus to leakage of stool not only adds a disease-specific negative psychological burden, but could also have overall mental impact to patients' general well-being. It is important for healthcare providers to approach those who suffer from AI as an opportunity for disease management leading toward better health.

The prevalence of combined flatal/fecal incontinence (87%) was much higher than either solely fecal (10%) or flatal (2.3%) incontinence in this single site study. The prevalence of flatal incontinence only reported by other existing studies of community dwelling women or other study populations has been reported to be as high as 49%, mostly in populations not actively seeking care for this condition.^{9,21,22} The low rate of flatal incontinence only in this current population may be explained by several factors. First, the definition of flatal incontinence varies among existing studies. Some studies have used the question from the Pelvic Floor Distress Inventory (PFDI-20), "do you usually lose gas from the rectum beyond your control?" to determine the presence of flatal incontinence.^{21,22} In those studies, it is

unclear whether women with concurrent stool leakage were excluded in their data analysis, as this may have inflated their reported prevalence of “flatal” only incontinence. In comparison, our study demonstrated the prevalence of solely flatal incontinence in a population of women seeking care for their condition. Moreover, the population analyzed in other studies included patients who presented to either gynecology or urogynecology clinics for various complaints, whereas the subjects in this current study were those typically referred from their primary care physicians or gynecologists to the urogynecology clinic specifically for evaluation of FI, AI or flatal incontinence. Populations studied in urogynecology clinics, in general, have been reported to have higher prevalence rates of FI and AI.^{10,25} The prevalence rate observed from the population in this study may differ from community-based samples. However, interestingly, this study suggests that more women with stool leakage seek medical care compared to those with flatal incontinence only, even though the impact of flatal incontinence only and FI on QOL was noted to be similar in this study.

Limited data suggest that flatal incontinence is more common among people with internal anal sphincter defects after undergoing lateral internal sphincterotomy for chronic anal fissure.²⁶⁻³⁰ However, anatomical or functional changes of the anorectum related to flatus have not been well documented. In this study, diagnostic testing with anal manometry showed that women with AI had the lowest baseline anal resting tone and squeeze pressures when comparing all three groups, however, no differences were noted with regard to external and internal sphincter defects among the 3 groups (global $p = 0.05$, 0.39 , respectively). Further research is needed to explore other risk factors leading to flatal incontinence, in general.

This study is limited by a small sample size of women with flatal incontinence only. However, the disproportionate distribution of fecal vs. flatal incontinence may be an accurate representation of women who seek care for bowel leakage presenting to a specialty clinic.

Strengths of this study include that overall this is a large population of well characterized women presenting with at least monthly bowel leakage symptoms characterized using validated measures. This study differs from existing studies, which reflect data from subjective measures only, as we also characterized differences in objective measures using anorectal manometry and endoanal ultrasonography to assess a broader perspective of fecal and flatal incontinence in women. In addition, we robustly compared populations accounting for multiple comparisons.

In conclusion, women with AI are more significantly impacted than those with FI. Despite a limited sample size, the impact of flatal incontinence only in women appears to have both physical and psychological burdens similar to that of women with FI, but further research is needed in women presenting for care with only flatal incontinence. The findings from this study add to the limited, yet growing literature on the differential impact of bowel incontinence, especially flatal incontinence, upon QOL. All individuals presenting with bowel incontinence should be specifically asked about flatal incontinence. More research in a larger sample of women with these conditions is needed to more fully understand the

pathophysiology of AI and flatal incontinence alone so treatment approaches can be optimized.

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Table 1

Patient Demographics

Groups	Overall (N=436)	AI [#] (N=381)	FI [#] (N=45)	FL [#] (N=10)	P (global)	P (AI vs FI)	P (FI vs FL)
Characteristics							
Age (years), mean $\pm$ SD	57 $\pm$ 14	57 $\pm$ 13	61 $\pm$ 16	46 $\pm$ 17	0.005	0.05	0.001
White Race, n (%)	378 (87%)	332 (87%)	36 (80%)	10 (100%)	0.19	0.19	0.19*
**BMI, n (%)					0.07*	0.42	0.04*
Underweight	11 (3%)	8 (2%)	2 (4%)	1 (10%)			
Normal	127 (29%)	111 (29%)	15 (33%)	1 (10%)			
Overweight	135 (31%)	118 (31%)	16 (36%)	1 (10%)			
Obese	163 (37%)	144 (38%)	12 (27%)	7 (70%)			
Smoker, n (%)	63 (14%)	58 (15%)	4 (9%)	1 (10%)	0.48	0.25	>0.99*
Prior Colorectal Surgery, n (%)	52 (12%)	49 (13%)	3 (7%)	0 (0%)	0.24	0.23	>0.99*
Hysterectomy, n (%)	307 (70%)	272 (71%)	31 (69%)	4 (40%)	0.10	0.73	0.14*
Sphincter disruption, n (%)	136 (31%)	121 (32%)	12 (27%)	3 (30%)	0.78	0.49	>0.99*

* Exact test

AI, anal incontinence; FI, fecal incontinence; FL, flatal incontinence

** Underweight; < 18.5kg/m², Normal; 18.5 and < 25 kg/m², Overweight; 25 and 30 kg/m², Obese; 30 kg/m²

Table 2**Bowel Symptom Distress and Impact**

	Overall (N=436)	AI (N=381)	FI (N=45)	FL (N=10)	P (global)	P (AI vs FI)	P (FI vs FL)
Total MMHQ, mean $\pm$ SD	51.3 $\pm$ 20.8	52.8 $\pm$ 20.4	40.9 $\pm$ 21.4	39.8 $\pm$ 19.4	0.0002	0.0002	0.89
Subscales of MMHQ							
1. Impact	57.1 $\pm$ 23.5	58.3 $\pm$ 22.7	48.9 $\pm$ 27.2	47.5 $\pm$ 27.5	0.02	0.01	0.86
2. Role	49.8 $\pm$ 28.5	51.9 $\pm$ 27.5	36.9 $\pm$ 30.3	26.3 $\pm$ 32.5	<0.0001	0.0007	0.27
3. Physical	51.9 $\pm$ 28.8	53.5 $\pm$ 27.8	40.8 $\pm$ 33.4	38.8 $\pm$ 34.6	0.007	0.005	0.83
4. Social	43.3 $\pm$ 32.8	44.8 $\pm$ 32.6	32.8 $\pm$ 33.4	31.3 $\pm$ 27.8	0.03	0.02	0.89
5. Relationship	42.4 $\pm$ 33.2	44.2 $\pm$ 33.1	27.8 $\pm$ 31.6	40.0 $\pm$ 29.3	0.007	0.002	0.29
6. Emotion	59.8 $\pm$ 26.1	61.2 $\pm$ 25.1	50.0 $\pm$ 32.0	50.0 $\pm$ 25.1	0.01	0.007	>0.99
7. Sleep/Energy	38.0 $\pm$ 32.0	39.5 $\pm$ 32.0	26.9 $\pm$ 29.8	32.5 $\pm$ 35.5	0.04	0.01	0.62
8. Severity	68.2 $\pm$ 20.2	69.2 $\pm$ 19.4	62.8 $\pm$ 22.1	52.5 $\pm$ 32.5	0.04 [*]	0.04 ^{**}	0.23 ^{**}
FISI	28.8 $\pm$ 12.5	31.0 $\pm$ 11.5	15.4 $\pm$ 6.8	5.4 $\pm$ 2.7	<0.0001 [*]	<0.0001 ^{**}	<.0001 [^]
SF-12 Subscale Score, mean $\pm$ SD							
PCS	41.5 $\pm$ 11.7	41.2 $\pm$ 11.7	43.3 $\pm$ 12.4	46.4 $\pm$ 11.1	0.22	0.27	0.45
MCS	41.6 $\pm$ 12.3	41.2 $\pm$ 12.4	45.7 $\pm$ 12.3	40.9 $\pm$ 8.7	0.08	0.03	0.26

* Kruskal-Wallis

** two sample t-test

[^] Wilcoxon rank-sum test

Table 3

Anorectal Diagnostic Test Results

	Overall (N=436)	AI (N=381)	FI (N=45)	FL (N=10)	P (global)	P (AI vs FI)	P (FI vs FL)
Anorectal manometry, mean (std)							
Resting Pressure mmHg	35.8 (19.2)	35.0 (18.6)	37.9 (16.3)	58.5 (35.7)	0.0004	0.33	0.002
Squeeze Pressure, mmHg	73.1 (36.0)	71.5 (35.0)	78.5 (32.1)	111.7 (61.1)	0.001	0.21	0.008
Rectal Capacity, mL	117.0 (55.4)	117.5 (55.7)	110.2 (56.2)	130.0 (38.4)	0.54	0.41	0.31
Endoanal ultrasonography, n (%)							
EAS defect	97 (22%)	86 (23%)	11 (24%)	0 (0%)	0.05*	0.41	0.009*
IAS defect	64 (15%)	58 (15%)	6 (13%)	0 (0%)	0.39	0.74	0.58

*
Exact test