Int Urogynecol J (2015) 26:657–663
DOI 10.1007/s00192-014-2563-y

ORIGINAL ARTICLE

Sexual function in women with anal incontinence using a new instrument: the PISQ-IR

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Received: 15 September 2014 / Accepted: 23 October 2014 / Published online: 13 November 2014

Abstract
Introduction Anal incontinence (AI) has been associated with sexual complaints. The Pelvic Organ Prolapse/Incontinence Sexual Questionnaire-IUGA Revised (PISQ-IR) has been validated to measure sexual function in sexually active (SA) and non-SA (NSA) women with pelvic floor disorders (PFD) including AI. We describe symptoms in women with PFDs including AI using this instrument.
Methods This was a planned secondary analysis of data collected for the validation of the PISQ-IR. SA and NSA women with symptoms of pelvic organ prolapse, urinary incontinence (UI) and/or AI at 12 US and 5 UK sites were recruited. The Female Sexual Function Index (FSFI) and PISQ-IR were completed in addition to the Pelvic Floor Distress Inventory (PFDI), and other measures.
Results Of 872 women enrolled, 90 (10 %) reported AI. Compared with women without AI, women with AI were more likely to report stress UI ($p=0.007$), urgency UI ($p<0.001$), mixed UI ($p<0.001$), diabetes ($p=0.036$) and depression ($p<0.001$), and to show larger genital hiatus measurements ($p=0.005$) and more underactive pelvic floor muscles ($p=0.011$). Furthermore, scores on the PFDI showed greater bother ($p=0.013$), particularly the colorectal subscale ($p<0.001$). While sexual activity was similar between the groups, FSFI desire ($p=0.016$), PISQ-IR 'condition-specific' ($p=0.03$) and 'global quality' ($p=0.046$) domains were worse in women with AI. In logistic regression analysis, only the PISQ-IR 'condition-specific' domain was associated with AI when controlling for other confounders (OR 0.27, 95 % CI 0.10 – 0.72, $p=0.009$).
Conclusions Women with AI have similar rates of sexual activity but poorer sexual function than women without AI. The PISQ-IR may be most appropriate to characterize these conditions.

Keywords Anal incontinence · Sexual function · PISQ-IR · FSFI · Pelvic floor disorder

This work was presented at the combined AUGS/IUGA International Meeting, Washington, DC, USA, July 2014.

The original study was made possible through funding from the International Urogynecological Association (IUGA).

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Introduction

Anal Incontinence (AI) is defined as the involuntary loss of flatus, liquid or solid stool that causes a social or hygienic problem [1]. The condition may have a devastating impact on quality of life [2], and has been associated with higher rates of sexual dysfunction [3–7]. While often under-reported, the

prevalence of AI ranges from 4 % in the general population to 24 % in the elderly [1, 3]. However, these rates may be even higher in women with other pelvic floor disorders (PFDs), with some studies suggesting coexisting AI in over 50 % [3].

Despite the pronounced impact of AI on sexual symptoms, available tools to assess sexual function have not been validated in this clinical subgroup. Many of the available questionnaires are reliable for the general population, such as the Female Sexual Function Index (FSFI) [8]. The Prolapse Incontinence Sexual Questionnaire (PISQ) and PISQ-12 were the first condition-specific questionnaires to target women with PFDs [9, 10]. Nevertheless, none of these questionnaires has been validated in women with AI. Moreover, the available literature assessing sexual function in women with AI focuses on specific cohorts, such as those following sphincter injury or prolapse surgery, making these results less applicable to all women with AI [5, 6, 11].

The Pelvic Organ Prolapse/Incontinence Sexual Questionnaire-IUGA Revised (PISQ-IR) is the only instrument validated in both sexually active (SA) and non-SA (NSA) women with PFDs, including women with AI [12]. The purpose of this study was to investigate and compare sexual activity and function in women with PFDs with and without AI using the PISQ-IR.

Materials and methods

The PISQ-IR is a new measure of sexual function in women with PFDs, first reported in 2013. The validation and design of this questionnaire have been previously described [13, 14]. In brief, 23 experts in urogynecology, female sexual function, and survey design convened in 2008 to construct a new instrument. The PISQ-12 [10] was chosen as the foundation, and the PISQ-IR was subsequently validated using 12 sites in the US and 5 sites in the UK. This report is the result of a planned secondary analysis of the baseline data collected for the validation study.

IRB approval was obtained from all sites, and all women gave written consent. To participate, women had to be 18 years or older, not pregnant, able to read/write and understand English and seeking treatment for urinary incontinence (UI) and/or AI and/or pelvic organ prolapse. Exclusion criteria were a diagnosis of vulvodynia, painful bladder syndrome, or chronic pelvic pain, defined as pelvic pain for longer than 6 months. Since this was a study to evaluate both sexual activity status and sexual function, women did not need to be sexually active to participate. Women were given a survey packet and asked to complete it in the office or at home following their visit.

After providing written consent, women underwent a physical examination, including assessment of pelvic floor support with the Pelvic Organ Prolapse Quantification Scale [15], pelvic floor muscle strength using the Oxford grading scale [16], and pelvic floor muscle rating for tone using recommendations defined by the International Continence Society (ICS) [17, 18]. Baseline characteristics collected included age, weight, height, ethnicity, gravity, parity, type of deliveries, menopausal status, marital/relationship status, and history of prior pelvic surgery and nonsurgical treatment for PFDs as well as current treatments. In addition, past medical history including diabetes, neurological disease and depression were collected. Clinicians indicated the diagnosis of one or more PFDs based on assessment of the physical examination findings, history and any other clinical data available. Definitions conformed to IUGA/ICS recommendations [12].

In addition to the 42-item validation version of the questionnaire, women also completed the Incontinence Severity Index (ISI) [19], a single question evaluating prolapse and its bother (question 35) from the Epidemiology of Prolapse and Incontinence Questionnaire (EPIQ) [20], the Pelvic Floor Distress Inventory-20 (PFDI-20) [21–23], and the FSFI [8]. The PFDI-20 assesses distress related to PFDs. Higher scores on both the PFDI and the EPIQ indicate greater distress due to the condition. The ISI measures the severity of urinary leakage with two questions. The FSFI is a 19-item, validated questionnaire used to screen subjects for sexual disorders. Six domains (desire, arousal, lubrication, orgasm, satisfaction and pain) are assessed with a maximum overall score of 36. Scores ≤26.55 suggest abnormal sexual function [24].

The PISQ-IR takes into consideration whether respondents are SA or NSA and yields either six domain-specific subscales for SA women, or four domain-specific subscales for NSA women. Domains for SA women include: arousal/orgasm (SA-AO), partner-related (SA-PR), condition-specific (SA-CS), global quality (SA-GQ), sexual desire (SA-D), and condition impact (SA-CI). Domains for NSA women include: condition-specific (NSA-CS), partner-related (NSA-PR), global quality (NSA-GQ), and condition impact (NSA-CI).

AI was categorized as present or absent based on the physician's description of the patient's PFD in the medical chart. For this study, subjects symptomatic for loss of gas, liquid or solid stool could be included. Statistical analyses used to assess comparisons between the groups included Student's *t* test, Pearson's chi-squared test, and Fisher's exact test. Nonparametric testing was applied when data were not normally distributed. Only complete subject datasets for each variable were considered valid. Since not all subjects answered all the questions the sample sizes varied from test to test. Significantly associated variables on univariate analyses were subsequently entered into a logistic regression model for assessment in AI subjects. Regression analyses were conducted for PISQ-IR SA-CS and SA-GQ, and FSFI desire. Variables included age, diabetes, depression, pelvic floor tone, AI, and genital hiatus. Data were analyzed using IBM SPSS® Statistics version 21 (IBM Corp, Armonk, NY). The initial study was funded by IUGA.

Table 1 Demographics and characteristics of subjects with and without AI

	Subjects with AI			Subjects without AI			*p* value
	Sample size (*N*)	Mean (SD)	*N* (%)	Sample size (*N*)	Mean (SD)	*N* (%)	
Age (years)	90	57.3 (13.24)		743	54.8 (12.51)		0.070[a]
BMI (kg/m^2)	76	28.8 (5.20)		664	28.0 (4.67)		0.140[a]
POP-Q							
Genital hiatus (cm)	88	3.9 (1.39)		710	3.5 (1.27)		**0.005**[a]
Perineal body (cm)	88	3.3 (1.04)		707	3.3 (0.91)		0.838[a]
Total vaginal length (cm)	89	9.0 (1.44)		709	9.0 (1.53)		0.782[a]
Sexually active	63		36 (57.1)	514		353 (68.7)	0.087[b]
Hispanic origin	75		10 (13.3)	532		82 (15.4)	0.733[b]
Race	75			512			0.589[c]
1 (American Indian)			0 (0)			11 (2.1)	
2 (Asian)			0 (0)			4 (0.8)	
3 (Black or African American)			2 (2.7)			12 (2.3)	
4 (Native Hawaiian)			0 (0)			1 (0.2)	
5 (Pacific Islander)			2 (2.7)			29 (5.7)	
6 (White)			71 (94.7)			455 (88.9)	
Education	74			501			0.696[c]
1 (8th grade or less)			4 (5.4)			16 (3.2)	
2 (some high school)			20 (27.0)			124 (24.8)	
3 (high school graduate)			22 (29.7)			146 (29.1)	
4 (trade school – vocational, technical, business)			28 (37.8)			215 (42.9)	
Marital status	90			747			0.413[c]
Married/living with partner			61 (67.8)			547 (73.2)	
Separated			3 (3.3)			20 (2.7)	
Divorced			14 (15.6)			114 (15.3)	
Widowed			9 (10.0)			38 (5.1)	
Never married			3 (3.3)			28 (3.7)	
Primary language	8			743			0.216[b]
English			86 (97.7)			700 (94.2)	
Other			2 (2.3)			43 (5.8)	
Hormonal status	89			738			0.417[b]
Premenopausal			29 (32.6)			276 (37.4)	
Postmenopausal			60 (67.4)			462 (62.6)	
Oxford grading scale (strength)	89			710			0.185[c]
No contraction			2 (2.2)			35 (4.9)	
Flicker			17 (19.1)			77 (10.8)	
Weak			33 (37.1)			238 (33.5)	
Moderate			25 28.1)			234 (33.0)	
Good			10 (11.2)			105 (14.8)	
Strong			2 (2.2)			21 (3.0)	
Pelvic floor muscle rating (tone)	88			738			**0.039**[d]
Normal			61 (69.3)			575 (77.9)	
Overactive			1 (1.1)			10 (1.4)	0.955[d]
Underactive			25 (28.4)			122 (16.5)	**0.011**[d]
Nonfunctioning			1 (1.1)			31 (4.2)	0.245[d]
Parity	90			737			0.148[c]
0 – 2			43 (47.8)			431 (58.5)	
3 – 5			44 (48.9)			289 (39.2)	

Table 1 (continued)

	Subjects with AI		Subjects without AI		*p* value
	Sample size (*N*) Mean (SD)	*N* (%)	Sample size (*N*) Mean (SD)	*N* (%)	
>5		3 (3.3)		17 (2.3)	
Delivery type	85		697		0.703[c]
All vaginal		71 (83.5)		604 (86.7)	
All cesarean section		5 (5.9)		30 (4.3)	
Both vaginal and cesarean section		9 (10.6)		63 (9.0)	
Comorbidities					
Diabetes	90	13 (14.4)	741	741 55 (7.4)	**0.036**[b]
Neurological disease	90	4 (4.4)	739	739 37(5.0)	10.000[b]
Depression	89	35 (39.3)	740	139 (16.8)	**<0.001**[b]
Pelvic floor disorders	90		751		
Symptomatic pelvic organ prolapse		44 (52.2)		382 (50.9)	0.824[b]
Stress urinary incontinence		70 (77.8)		477 (63.5)	**0.007**[b]
Urge urinary incontinence		62 (68.9)		357 (47.5)	**<0.001**[b]
Mixed urinary incontinence		54 (60.0)		274 (36.5)	**<0.001**[b]
Surgical history					
Urinary incontinence procedure	90	20 (22.2)	746	95 (12.7)	**0.022**[b]
Prolapse procedure with graft	90	8 (8.9)	740	35 (4.7)	0.124[b]
Prolapse procedure without graft	90	15 (16.7)	741	88 (11.9)	0.234[b]
Hysterectomy	90	34 (37.8)	744	226 (30.4)	0.185[b]
Bilateral salpingo-oophorectomy	90	9 (10.0)	741	98 (13.2)	0.505[b]

Significant *p* values (<0.05) are noted in bold

All subjects with valid data for the variable tested were included; therefore, sample sizes often varied from test to test

[a] Student's *t* test

[b] Fisher's exact test

[c] Pearson chi-squared

[d] Logistic regression

Results

Of 872 women enrolled and who completed the baseline questionnaires, 90 (approximately 10 %) were classified as having AI. While AI subjects tended to be older than women without AI, with a mean age of 57 years (SD 13.24 years), the difference in age approached but did not achieve significance (p=0.07). Other demographic factors such as menopausal status and parity were similar between the groups. However, pelvic floor muscle tone ratings, comorbid conditions of diabetes, depression, stress UI, mixed UI, urgency UI and history of prior UI procedures were significantly different between women with and without AI (Table 1).

Women with AI showed higher overall PFDI scores (p= 0.013), suggesting greater bother from their PFD. As expected, women with AI also had higher scores on the colorectal-anal distress inventory subscale of the PFDI (p<0.001). Other indices, such as the ISI, were not different between the groups (Table 2).

Sexual activity and function were evaluated. Whereas women with AI were as likely as those without AI to report sexual activity (Table 1), sexual function was poorer in those with AI (Table 3) as measured by the FSFI and PISQ-IR. FSFI scores in the desire domain were lower in those with AI (p= 0.016). Other domains of the FSFI were similar, as were PISQ-IR scores in those who were not sexually active. However, in those who did report sexual activity, both PISQ-IR condition-specific and global quality domains were worse (p= 0.003 and p=0.046, respectively) in women with AI than in women without AI.

Factors significantly associated with AI above were entered into logistic regression models for PISQ-IR SA condition-specific and global quality, and FSFI desire. For FSFI desire, only diabetes and age were significant in the final model, and suggested poorer function with advancing age (OR 0.97, 95 % CI 0.95 – 0.98, p<0.0001) and diabetes (OR 0.36, 95 % CI 0.15 – 0.85, p=0.020). For PISQ-IR global quality, no predictors were significant. However, for the PISQ-IR condition-

Table 2 Validated questionnaires in subjects with and without AI

	Subjects with AI			Subjects without AI			*p* value
	Sample size (*N*)	Median (IQR)	*N* (%)	Sample size (*N*)	Median (IQR)	*N* (%)	
Pelvic Floor Distress Inventory							
Pelvic Organ Prolapse Distress Inventory-6	43	41.7 (25, 66.7)		290	1.7 (29.2, 58.3)		0.791[a]
Colorectal Anal Distress Inventory-8	44	6.7 (35.2, 68.8)		296	5 (9.4, 43.8)		**<0.001**[a]
Urinary Distress Inventory-6	44	7.9 (30.8, 69.2)		298	0 (29.2, 70.8)		0.923[a]
Total score	44	44.3 (123.4, 172.4)		298	16.7 (83.1, 157.6)		**0.013**[a]
Incontinence Severity Score	62			503			0.095[b]
Dry			9 (14.5)			81 (16.1)	
Slight			12 (19.4)			110 (21.9)	
Moderate			31 (50.0)			175 (34.8)	
Severe			10 (16.1)			137 (27.2)	

Significant *p* values (<0.05) are noted in bold

All subjects with valid data for the variable tested were included; therefore, sample sizes often varied from test to test

[a] Independent samples Mann-Whitney *U* test

[b] Pearson chi-squared test

Table 3 Sexual function in subjects with and without AI

	Subjects with AI			Subjects without AI			*p* value
	Sample size (*N*)	Mean (SD)	Median (IQR)	Sample size (*N*)	Mean (SD)	Median (IQR)	
FSFI							
Desire	62	2.49 (1.24)		504	2.93 (1.37)		**0.016**[a]
Arousal	32	3.68 (1.55)		290	4.01 (1.37)		0.212[a]
Lubrication	32	4.08 (1.33)		290	4.38 (1.53)		0.279[a]
Orgasm	32	3.79 (1.67)		293	4.18 (1.55)		0.174[a]
Satisfaction	32	2.64 (0.91)		288	2.92 (0.95)		0.112[a]
Pain	31	4.77 (1.44)		257	4.92 (1.36)		0.567[a]
Total	32	18.81 (5.07)		295	19.54 (5.75)		0.490[a]
PISQ-IR							
Subscales: not sexually active							
Partner-related	22		66.67 (29.2, 100)	139		66.67 (33.3, 100)	0.884[b]
Condition-specific	19		44.44 (0, 77.8)	123		33.33 (0, 66.7)	0.463[b]
Global quality	22		67.86 (18.6, 94.6)	138		57.12 (28.6, 78.9)	0.994[b]
Condition impact	22		33.33 (0, 66.67)	132		33.33 (0, 66.7)	0.943[b]
Subscales: sexually active							
Arousal/orgasm	36		56.25 (43.8, 75.0)	345		62.5 (50.0, 75.0)	0.487[b]
Partner-related	32		77.78 (66.7, 97.2)	316		77.78 (55.6, 88.9)	0.838[b]
Condition-specific	35		83.33 (58.3, 91.7)	332		91.67 (83.3, 100)	**0.003**[b]
Global quality	35		46.67 (20.0, 60.0)	339		53.33 (33.3, 80.0)	**0.046**[b]
Condition impact	36		62.5 (43.8, 83.3)	349		75.0 (41.7, 100)	0.197[b]
Desire	36		50.0 (41.7, 58.3)	352		50.0 (33.3, 66.7)	0.602[b]

Significant *p* values (<0.05) are noted in bold

[a] Student's *t* test

[b] Independent samples Mann-Whitney *U* test

specific domain, only AI significantly predicted a low score when controlling for the other significant confounders (OR 0.27, 95 % CI 0.10 – 0.72, p=0.009).

Discussion

In this large cross-sectional study of women recruited from several national and international sites, AI was associated with comorbidities of depression and diabetes, as well as worse quality of life, related to their pelvic floor symptoms and colorectal distress. Furthermore sexual function was notably affected in SA subjects with AI as measured using the condition-specific domain of the PISQ-IR and desire domain of the FSFI. Following multivariate assessment, the PISQ-IR appeared to be the best measure for condition-specific impact related to AI.

The influence of AI on sexual function remains controversial. While some studies have indicated a negative effect of AI on FSFI scores [6, 7, 11], PISQ-12 [3] and other parameters of sexual health [25, 26], others have shown no differences among cohorts. Patel et al. conducted a retrospective review of 227 subjects presenting with PFDs [27]. Of these 227, 112 (49 %) had AI, as defined by answering 'yes' to a single question of the PFDI-20. Sexual function was not different among groups when controlling for prolapse stage. However, patient bother from AI was not evaluated, and whether the AI led these subjects to seek treatment was also not reported. Trowbridge et al. studied 86 women who had undergone anal sphincteroplasty but without a comparison group, and found that in these subjects following surgical treatment sexual function did not correlate with continence [28]. Our results are similar to those of others in populations with PFD [3, 4]. Thus we believe there is strong evidence to support a negative impact on sexual health from AI. Furthermore, the ability of the PISQ-IR to document condition-specific impact and measure symptoms in both SA and NSA subjects suggests this robust tool may be most useful for characterizing symptoms in women with PFDs.

Whereas AI may lead to sexual dysfunction, it does not appear to dramatically affect the rate of sexual activity. It is possible that women suffering from this condition adapt a 'response shift', or coping strategies, to mitigate the impact of the AI on their daily activities [28]. Our findings are consistent with other published reports in this regard [3, 4, 28]. Furthermore, while AI symptoms were noted in only 10 % of our subjects, which is somewhat lower than expected [3], we believe that this could have been due to the study design. Only patients with symptomatic AI as a component of their PFD were included this cohort, and thus we may have selected a smaller subgroup of subjects who had more bothersome AI.

Our study had some limitations. The overall number of women with AI was small and this affected our ability to analyze more subtle relationships among the variables. The sample size was further restricted by the fact that not all subjects answered all the questions. We also could not characterize the nature of the AI, as the data collected did not include severity in terms of gas, liquid or solid stool. Strengths included the use of a new instrument validated to outline symptoms in this population, as well as the use of other validated measures for PFDs and sexual function. We had a large overall sample size, with diverse geographical origins and complaints, adding to the generalizability of this information. Given the paucity of information describing these symptoms in women with AI, we believe our results are noteworthy and add value to the body of knowledge on this subject.

In conclusion, AI has a wide ranging impact on sufferers, including a greater rate of sexual dysfunction. While the difference in sexual function was only noted in one domain of the FSFI and two of the PISQ-IR, this may have been due to our small sample size of women with AI. Future research utilizing the validated PISQ-IR in women with AI and details regarding their symptom severity as well as a larger sample size would aid in elaborating this phenomenon. Identifying women at risk of these conditions is the first step toward the development of strategies to mitigate the effects of these negative symptoms on women's overall quality of life.

Acknowledgements The authors wish to acknowledge Angela Fellner, PhD, and Janine Benbouajili, MA, for their assistance with data analysis and Vivian Ghodsi, RN, for her involvement in recruitment.

Conflicts of interest Rebecca Rogers is DSMB chair for the TRANSFORM trial sponsored by American Medical Systems and receives royalties from UptoDate and McGraw Hill. She is an Associate Editor for the International Urogynecology Journal.

Mitesh Parekh is a speaker for Astellas and consultant for Boston Scientific..

Peter Sand is a consultant or receives royalties from Boston Scientific, Ferring, Allergan, Cook Myosite, Astellas, Actavis, Hologic and AlltheRx.

Joan Pitkin receives honoraria and holds a position with the Northwest Hospitals NHS Trust.

Dorothy Kammerer-Doak and Rachel Pauls have have no financial conflicts of interest to disclose.

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