

Prevalence of double incontinence in patients with fecal incontinence undergoing anorectal manometry and discriminating factors

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Abstract

Background: Double incontinence (DI) is the concomitant presence of incontinence for urine and stool. Aim of this study is to assess prevalence of DI in patients with fecal incontinence (FI) undergoing Ano-Rectal Manometry (ARM) in a tertiary care center and to identify factors discriminating between both.

Methods: Medical records of consecutive patients referred for ARM for FI during 2 years at University Hospital Brussels were retrospectively reviewed. Results from ARM, presence of diarrhea, diseases from recto-anal or peri-anal region, prior abdominal, proctological or urological surgery and neurological comorbidities were recorded.

Results: Of 101 enrolled patients, 77% suffered from solitary FI and 23% from DI. Diarrhea was more common in DI vs. FI (43,5% vs. 15,4%, $P=0.008$), as was the presence of neurological comorbidities (34,8% vs. 10,3%, $P=0.009$) and urological interventions (21,7% vs. 1,3%, $P=0.002$). In respect to women only, more urological interventions were performed (20% vs. 0%, $P=0.006$) and more diseases from recto-anal or peri-anal region were encountered in DI vs. FI (35,0 % vs. 12,5 %, $P=0.045$). In men, neurological disorders were significantly more common in DI (100,0% vs. 3,3%, $P=0.002$).

Conclusions: This study identified gender-specific patterns of comorbidities in FI and DI. ARM had no distinctive value between FI and DI in men and women. A prospective study should provide more information on patients at risk for incontinence and help to identify distinct features between FI and DI in men and women. (*Acta gastroenterol. belg.*, 2022, 85, 277-281).

Keywords: Fecal incontinence, manometry, pelvic floor disorders, urinary incontinence.

Introduction

Double incontinence (DI) is the concomitant incontinence for urine and stool. Studies report a prevalence of DI between 3 to 5% among adults, with consistently higher numbers in women (1-5). The prevalence of isolated fecal incontinence (FI) is higher, estimated at 7% and 18% in community-dwelling adults and similar or lower in men than women (6,7).

In general, the prevalence of incontinence remains underestimated as a consequence of underreporting by patients and underassessment by healthcare providers (8). A study of Edwards et al. shows that more than 50% of the patients with FI do not discuss this issue with their doctor (9). Moreover, health care professionals rarely screen for FI. While 75 % of the primary care providers actively screen for urinary incontinence (UI), the screening rate for FI remained as low as 35% (10).

Epidemiological studies have identified a number of risk factors for FI, including presence of diarrhea,

increasing age, elevated BMI, rectal urgency, cholecystectomy, anal fistula, non-childbirth related anal injury, UI, psychoactive medication and chronic illness (8,11,12). DI appears primarily associated with advanced age in both sexes (5). In women, an association has been identified between DI and non-Hispanic white race, medical comorbidities such as depression, functional limitations, neurological disease and hypertension, hysterectomy, multiparity, falls in the last year and difficulties with at least three instrumental activities of daily living (IADL) and diarrhea (1,3,5). In men, ADL impairment and poorer self-rated health have been associated with DI (1).

Rome IV, in contrast to Rome III, makes no distinction in FI based on presumed functional versus structural or neurogenic etiology (13). This reflects the consensus that the etiology of FI is multifactorial. As reliance on symptoms to guide therapy has proven inadequate, diagnostic tests of anorectal function could facilitate patient management when conservative therapy fails (14).

In contrast, little is known about the pathophysiology underlying DI. Physiologic models of UI and FI indicate pelvic floor dysfunction as a common mechanism (4), but whether DI represents a more severe form of pelvic floor dysfunction has not been ascertained.

The aim of this study is to assess the prevalence of DI in women and men with FI who underwent Ano-Rectal Manometry (ARM) in a tertiary care center in Belgium and to identify factors discriminating between FI and DI.

Material and methods

The medical records of consecutive patients aged 18 years or older and referred for ARM for FI between July, 1st 2017 and June, 30th 2019 at the University Hospital Brussels (UZ Brussel) were reviewed. The study was conducted with approval by the Medical

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The presence of UI was extracted from medical records. Results from ARM, presence of diarrhea, diseases from recto-anal or peri-anal region, prior abdominal, proctological or urological surgery and neurological comorbidities were recorded. For further analysis, patients were divided into four subgroups based on gender and incontinence status: women with solitary FI, men with solitary FI, women with DI and men with DI.

ARM studies were performed by the same experienced gastroenterologist. A water-perfused manometry catheter with pressure sensors measuring 4 quadrants of the anal sphincter and a distal balloon was used. The catheter was connected to an Electrically Powered Manometric Pump (Mui Scientific®, model P3RIP622SS, serial number MS6-1003) and a display (MSI Vision®). During the examination, the patient was positioned in the left lateral position. No prior bowel preparation was administered. An empty rectal ampulla was confirmed by digital rectal examination. Correct positioning of the manometry catheter was confirmed visually before measurements were recorded.

The following parameters of anorectal function were assessed: high pressure zone length, maximum resting pressure, maximum voluntary squeeze pressure, first perception volume, RAIR and the recto-anal coordination during simulated defaecation. The high pressure zone represents the length (cm) of the anal canal with resting pressures 30% higher than rectal pressure; maximum resting pressure the highest resting pressure recorded (normal range: 50-110 mmHg). Maximum voluntary squeeze pressure is the highest pressure recorded above the baseline at any level of the anal canal during maximum squeeze effort. First perception or sensory threshold is expressed by the minimum rectal volume perceived by the patient when inflating the balloon at the catheter's tip (normal values 20-50 ml). The RAIR was assessed by inflating the intrarectal balloon with up to 50 ml of air. During simulated defaecation, dyssynergia was traced, i.e. paradoxical anal sphincter contraction or absence of relaxation during simulated evacuation.

Statistical analysis were performed using SPSS (IBM Corp. Released 2020. IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp). Data are presented as frequencies (percentages) or averages (standard deviation). Comparisons between groups were performed using unpaired t-test for parametric variables and Fisher exact test for categorical data. A *p*-value of <.05 was considered significant.

Results

One hundred and one adults underwent an ARM for FI between July, 1st 2017 and June, 30th 2019. Of these, 78 (77%) patients suffered from solitary FI and 23 (23%) from DI. The majority of patients in both the solitary FI

Table 1. — Gender distribution and mean age of the total study population

Total number of patients , n		101
Patients with FI, n (%)		78 (100%)
Sex	Female, n (%)	48 (62%)
	Male, n (%)	30 (38%)
Mean age ± SD (range)		65.1 ± 16.4 (22-89)
Patients with DI, n (%)		23 (100%)
Sex	Female, n (%)	20 (87%)
	Male, n (%)	3 (13%)
Mean age ± SD (range)		64.5 ± 17.3 (19-85)

and the DI group were women (resp. 62% and 87%). There was no significant difference in age between both groups (65±16.4 years vs. 65±17.3 years, *p*=.9) (Table 1).

Clinical data

Diarrhea was more common in the DI patients compared to FI patients (resp. 43% vs. 15%, *p*=.008). There was a trend towards higher prevalence of diarrhea in DI in both gender subgroups (men: 13 vs. 67%, *p*=.078, women: 17 vs. 40%, *p*=.059).

Neurological comorbidities were more frequently observed in the DI group (35% vs. 10%, *p*=.009). In terms of previous surgery, significantly more patients with DI had undergone urological interventions than the patients in the FI group (22% vs. 1%, *p*=.002).

Presence of diabetes mellitus, diseases from recto-anal or peri-anal region and history of proctological or abdominal surgery was comparable between groups (Table 2).

In respect to women only, significantly more urological interventions had been performed (20% vs. 0%, *p*=.006)

Table 2. — Comorbidities in the total population with FI and DI

	FI (n = 78)	DI (n = 23)	<i>P</i> -value
Diarrhea	12/78 (15%)	10/23 (43%)	.008*
Neurological disorders	8/78 (10%)	8/23 (35%)	.009*
Urological surgery	1/78(1%)	5/23 (22%)	.002*
Proctological surgery	9/78 (12%)	5/23 (22%)	.300
Abdominal surgery	24/78 (31%)	8/23 (35%)	.800
Diseases from recto-anal or peri-anal region	12/78 (15%)	7/23 (30%)	.131
Diabetes mellitus	7/78 (9%)	2/23 (9%)	1.000

*significant results (*P*<.05)

Table 3. — Comorbidities in females with FI and DI

	Female with FI (n=48)	Female with DI (n=20)	P-value
Diarrhea	8/48 (17%)	8/20 (40%)	.59
Neurological disorders	6/48 (12%)	5/20 (25%)	.279
Urological surgery	0/48 (0%)	4/20 (20%)	.006*
Proctological surgery	6/48 (12%)	5/20 (25%)	.279
Abdominal surgery	21/48(44%)	8/20 (40%)	1.000
Diseases from recto-anal or peri-anal region	6/48(12%)	7/20 (35%)	.045*
Diabetes mellitus	4/48 (8%)	2/20 (10%)	1.000

*significant results ($P<.05$)

Table 4. — Comorbidities in males with FI and DI

	Male with FI (n=30)	Male with DI (n=3)	P-value
Diarrhea	4/30 (13%)	2/3 (67%)	.078
Neurological disorders	2/30 (7%)	3/3 (100%)	.002*
Urological surgery	1/30 (3%)	1/3 (33%)	.176
Proctological surgery	3/30 (10%)	0/3 (0%)	1.000
Abdominal surgery	3/30 (10%)	0/3 (0%)	1.000
Diseases from recto-anal or peri-anal region	6/30 (20%)	0/3 (0%)	1.000
Diabetes mellitus	3/30 (10%)	0/3 (0%)	1.000

*significant results ($P<.05$)

and more diseases from recto-anal or peri-anal region was encountered in DI vs. FI (35% vs. 12 %, $p=.045$). The other variables were comparable in the female FI and DI group (Table 3).

In men, only neurological disorders were significantly more common in DI vs FI, respectively 100% vs. 7% ($p=.002$) (Table 4).

Anorectal manometry

No difference in ARM measurements between FI and DI could be identified in the patient group as a whole, neither in women or men separately, neither was there a statistical difference in the prevalence of dyssynergia.

Discussion

This study assessed retrospectively the prevalence of and discriminating factors for DI in patients undergoing ARM for FI. This is, to our knowledge, the first study comparing FI and DI in both men and women. According to our results, prevalence of FI and DI is higher in women. In previous studies, the prevalence was either comparable or higher in women than men (6,7). Selection bias has to be taken into account since only patients who had undergone an ARM were recruited, as compared to questionnaire-based assessment of incontinence.

A number of studies have demonstrated clinically relevant features of ARM such as sphincter hypotonia and hypocontractility in patients with FI (15-17) and sphincter hypertonia as a feature of an anal fissure (18) or constipation (19). However, according to our results, distinctive ARM measures between FI and DI are lacking, in the total population, as well as in the gender-subgroups.

Although ARM is the most frequently performed, accepted and best established investigation of anorectal function, there is still debate on the value of this anorectal investigation in FI (20) with some investigators suggesting that digital rectal examination, patient history and clinical examination alone are sufficient (14). Furthermore, interpretation of ARM finding can be challenging owing to the wide variability and overlap of manometric measurements in health and disease (14). Previous studies showed that 9% of women and 18% of men with FI had normal results on routine anorectal investigations. Additionally, ARM was not able to predict the severity of FI (21).

Other factors contributing to incontinence, extrinsic to the anorectum and therefore not recorded by ARM, such as diarrhea and neurogenic factors, provide yet another explanation for the lack of distinctive value of ARM. In this study we identified a higher prevalence of diarrhea in the DI group as a whole, and a trend when assessing both genders separately.

New ARM developments potentially harbour more information. Firstly, ARM has been shown to be an accurate test for patients with FI according to a recent meta-analysis (17) with sphincter hypotonia and hypocontractility being associated with FI (15,16). Secondly, studies demonstrated greater resolution of anorectal pressure environment and sensitivity to rapid pressure changes using High Resolution Anorectal Manometry (HR ARM) with solid-state catheters (22). Additionally, three-dimensional HR ARM (3D-ARM), referred to as high-definition ARM, provides additional structural and functional information on the anorectum. Diagnostic gains of 3D-ARM include the assessment of the anal sphincter complex, the integrity of the puborectalis muscle and the possible correlation of pressure defects with sphincter injuries detected by endoanal ultrasound (20,23). Further research should investigate the added value of HR-ARM in FI and DI.

DI is often described as the most severe manifestation of pelvic floor dysfunction (4), suggesting that incontinence forms a continuum with DI at the end of the spectrum. Bliss et al. (24) and Musa et al. (25) showed that incontinence worsens rapidly after nursing home admission. UI is a risk factor for DI in these individuals. By six months, nearly one-third of admitted residents had developed DI with a further increase to about 40% at one year.

Both the Nurses' Health Study (5) and the SABE study (3) identified factors associated with DI in women. Age older than 80 years, depression, neurologic disease, chronic obstructive pulmonary disease, functional limitations, hypertension, polypharmacy, falls in the last year, multiparity and higher birth weight of the offspring were associated with DI. Evidence on factors associated with DI in men remain sparse. Wu et al. observed an association with ADL impairment and poorer self-rated health in males (1).

We uncovered gender-specific patterns of comorbidities in FI and DI. Women with DI have more diseases from recto-anal or peri-anal region and had more previous urological surgery than women with FI. Men with DI present more frequently with a neurological disease than men with FI alone, which is not observed in women. Neurological diseases can cause incontinence by altering normal neural transmission with a loss of sensation, impaired reflexes, secondary myopathy and loss of accommodation and central cortical inhibition (26). Both men with FI and men with DI generate significantly higher resting pressure and maximal squeeze pressure than women. These findings suggest that FI and DI in men and women have a distinct etiology, rather than being different presentations of the same underlying disorder. Gaining information about risk factors and etiology can lead to targeted treatment and hopefully improve cure rates. This improvement is essential since many patients with incontinence remain currently uncured and continuously rely on containment products such as pads and catheters (27).

The retrospective study design with inherent bias and confounders and the small sample size, especially for the male DI group, are the main limitations of this study. Information bias with missing data, especially for BMI, urological assessment and obstetric information, cannot be excluded as our study relies on data registration in the medical record. We had no access to data when patient was referred from another centre. Selection bias in our study population results from the recruitment of FI patients from the manometry database, which affects external validity since not all FI patients undergo ARM.

As mentioned before, neurological diseases can precipitate incontinence by altering normal neural transmission (26). Besides incontinence due to structural and functional abnormalities, cognitive dysfunction and impaired mobility in neurological disease contribute to incontinence. This confounder should be ruled out in further studies.

Another potential limitation is the used equipment. The manometry data were derived from low resolution, water-perfused ARM, susceptible to measurement artefacts. All included patients in this study underwent conventional manometry to ensure consistency throughout the study group. This technique is still commonly used, with approximately half of the institutions relying on low-resolution manometry according to a recent international survey in 107 different institutions (28). In the future, more widespread use of 3D-High Resolution solid state ARM, eliminating the requirement for continuous water perfusion while increasing the resolution, could provide additional information.

The results of this retrospective study can guide the development of future studies on FI and DI. A prospective study will improve the accuracy of data collection and can add additional information such as oncological history, to better characterize FI and DI phenotypes and to identify risk factors in men and women. This could confirm whether DI represents a separate entity with unique associations or whether it is part of a continuous sequence of a progressive disorder.

Aiming to determine the impact of incontinence, severity of both FI and UI can be evaluated by disease specific questionnaires and impact on quality of life should be compared between both groups.

Application of a standardized ARM protocol according to the *London classification* for disorders of anorectal function will enhance the quality of the investigation, the clinical interpretation and would facilitate collaboration by improving the comparability of results (29). Implementation of 3D HR ARM can add valuable information on sphincter integrity, targeting further investigations and treatment choices such as surgery or sacral neural modulation. Identified abnormalities can be compared between subjects with FI and DI.

In conclusion, this study identified differences in comorbidities between the FI and DI group in both women and men. According to our data, FI and DI in men and women should be considered as two separate disorders, rather than being different presentations of the same underlying etiology; pelvic floor dysfunction. Diarrhea, neurological disease and urological interventions were more common in DI group. Males with DI present more frequently with neurological comorbidities and women with DI have more anatomical anomalies and underwent more urological surgery compared to the FI group. However, ARM had no distinctive ability. These results should be verified in a prospective study.

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No conflicts of interest to disclose

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