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Original Research Article

# Prevalence of Double Incontinence and Lower Urinary Tract Symptoms in Patients with Fecal Incontinence: A Single-center Observational Study

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**Abstract**

**Objectives:** Double incontinence (DI), which is the co-occurrence of fecal incontinence (FI) and urinary incontinence (UI), increases with age and has a greater negative impact on the quality of life (QOL) than either incontinence alone. We aimed to assess lower urinary tract symptoms (LUTS) in patients with FI to elucidate the prevalence and characteristics of DI.

**Methods:** This study enrolled consecutive patients who visited our hospital with FI symptoms. FI was evaluated using the Cleveland Clinic Florida Fecal Incontinence Score (CCFIS). LUTS were assessed using the International Prostate Symptom Score (IPSS), QOL score (IPSS-QOL) and Overactive Bladder Symptom Score (OABSS).

**Results:** This study evaluated 140 patients (96 women [mean age: 70.7 years] and 44 men [mean age: 74.4 years]). The mean IPSS was significantly higher in men than in women (12.0 vs. 7.5, p = 0.003). A positive correlation was found between IPSS and CCFIS in women (r = 0.256, p = 0.012) but not in men. For both sexes, the older group (aged ≥70 years) had higher OABSS scores and more urge UI instances than the younger group (aged ≤69 years). Of the 140 patients with FI, 78 (55.7%) had DI, and DI was more common in women than in men (63.5% vs. 38.6%, p = 0.006).

**Conclusions:** The characteristics of LUTS and UI in patients with FI were comparable to those in the general population for both sexes; however, the prevalence of DI was much higher among patients with FI than that in the general population.

**Keywords**

double incontinence, fecal incontinence, lower urinary tract symptoms, overactive bladder, pelvic organ prolapse, urinary incontinence

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## Introduction

Fecal incontinence (FI) is defined as the involuntary or uncontrolled loss of liquid/solid stool[1]. The prevalence of FI increases with increasing age and has a devastating effect on the quality of life (QOL)[2,3]. Similarly, urinary incontinence (UI) also increases with advancing age and negatively affects patients' mental health and social activities[4]. Double incontinence (DI), which is the co-occurrence of FI and UI, has a greater negative impact on QOL than either incontinence alone[5-7]. The prevalence of DI ranges from 2-10% in community-dwelling populations and 23-75% in nursing

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home residents[7-17].

The International Continence Society (ICS) defines UI as any type of involuntary loss of urine, regardless of severity[5]. UI is classified into three types: stress urinary incontinence (SUI), urge urinary incontinence (UUI), and mixed urinary incontinence (MUI)[5]. A large epidemiologic study found UI to be more common in women (13.1%) than in men (5.4%), and the most common UI type in women was SUI (48.9%)[18]. SUI is characterized by the involuntary loss of urine that occurs with increased abdominal pressure (e.g., with effort, coughing, or sneezing)[19]. UUI is characterized by urine leakage that may preceded or be accompanied by a sense of urinary urgency owing to detrusor hyperactivity. MUI is a combination of SUI and UUI[20].

Traditionally, UI and other lower urinary tract (LUT) dysfunctions have been evaluated using objective tests such as uroflowmetry; however, recently, the importance of patient-reported outcome measures on subjective symptoms has been recognized[20]. The ICS classifies LUT symptoms (LUTS) into three categories: storage symptoms, voiding symptoms (e.g., slow stream and straining), and postmicturition symptoms (e.g., feeling of incomplete emptying)[20]. Storage symptoms include frequent urination, nocturia, urgency, and UI. Unlike voiding symptoms, storage symptoms do not cause potentially life-threatening upper urinary tract symptoms; however, storage symptoms have a greater impact on QOL than voiding or postmicturition symptoms[21].

Various validated questionnaires have been used to assess the disease severity and QOL in patients with LUT dysfunction. The International Prostate Symptom Score (IPSS) and QOL score (IPSS-QOL) are widely used severity indices that assess both storage and voiding symptoms[22,23]. The IPSS was originally designed for men with benign prostatic hypertrophy (BPH); however, it has been validated for the evaluation of female LUTS and is also used to evaluate LUTS associated with pelvic organ prolapse (POP) in women[23-26]. The Overactive Bladder Symptom Score (OABSS) is a symptom questionnaire developed in Japan and is used to diagnose and evaluate the severity of overactive bladder (OAB)[27].

Most epidemiological studies on DI, including FI and UI, have been conducted in the developed Western countries, with few reports from East Asia, and only one from Japan by Nakanishi et al[7-17]. In clinical practice, there have been several reports on FI symptoms in patients with UI, but few reports on UI symptoms in patients with FI[28-30]. Therefore, the prevalence of DI and characteristics of LUTS in patients with FI are unknown. This study aimed to assess LUTS in Japanese patients with FI using the IPSS and OABSS to elucidate the prevalence and characteristics of DI.

## Methods

This was a retrospective study of prospectively collected clinical data at our hospital. The study design was approved by the Institutional Review Board of Kunimoto Hospital (approval code: K23-004) and the Asahikawa Medical University Ethical Committee (approval number: 1355). Written informed consent was obtained from all patients.

### *Study population*

All consecutive patients who visited our hospital due to FI symptoms between September 2012 and February 2014 were included in this study. Patients were excluded if they had symptomatic anorectal abnormalities such as anal fistulas, anal strictures, prolapsed hemorrhoids, perianal abscess, anorectal cancer, large rectoceles, or rectal prolapses detected on proctologic examination or defecography. Patients with only gas incontinence at baseline were also excluded.

### *Anorectal examinations*

All patients underwent appropriate evaluations for FI, including a questionnaire survey based on the Cleveland Clinic Florida Fecal Incontinence Score (CCFIS), digital rectal examination, proctoscopy, anal manometry, anorectal sensitivity testing using electrical stimulation or a rectal balloon, anal ultrasound, and defecography when necessary. The CCFIS is the sum of five items: impact on lifestyle, use of pads, loss of gas, liquid stools, and solid stools, with a total score of 0 indicating complete continence and 20 indicating the most severe FI[31]. Anal manometric studies were performed with the patient in the left lateral position, using a one-channel microtip transducer mounted on a flexible catheter (P-1401; Star Medical Inc., Tokyo, Japan). Maximal resting pressure (MRP) was recorded using a rapid pull-through technique and defined as the highest recorded pressure. Subsequently, the maximal squeeze pressure (MSP), defined as the highest recorded pressure above the baseline at any level within the anal canal, was measured.

### *Outcome measures*

LUTS were assessed using IPSS, IPSS-QOL, and OABSS questionnaires. The IPSS consists of seven questions related to LUTS, with scores of 0-7 indicating mild symptoms, 8-19 moderate symptoms, and 20-35 severe symptoms[23-25]. The OABSS consists of four questions on OAB symptoms, with maximum scores ranging from 2-5: daytime frequency (2 points), nighttime frequency (3 points), urgency (5 points), and UUI (5 points)[27]. The total score ranges from 0-15 points, with higher scores indicating higher symptom severity. Questions about SUI were not included in either the IPSS or OABSS; therefore, the following question was added to the above questionnaires: “Do you have leakage of urine when you cough, sneeze, laugh, or strain your abdo-

**Table 1.** Characteristics of the Study Population (n = 140).

| Variable | Men | Women | p-value |
|---|---|---|---|
| Number of patients (%) | 44 (31.4) | 96 (68.6) | - |
| Age, year | 74.4 (11.9) | 70.7 (11.8) | 0.093 |
| History of vaginal delivery | - | 84 (87.5) | - |
| Height, cm | 163.7 (5.9) | 150.8 (7.3) | <0.001 |
| Weight, kg | 61.0 (11.1) | 51.6 (9.3) | <0.001 |
| Body mass index, kg/m$^2$ | 23.0 (4.2) | 22.7 (3.8) | 0.653 |
| Fecal incontinence types, n (%) | | | |
| Passive | 32 (72.7) | 59 (61.5) | 0.136 |
| Urge | 4 (9.1) | 3 (3.1) | |
| Passive and urge | 8 (18.2) | 34 (35.4) | |
| Mean CCFIS | 7.8 (4.3) | 9.6 (4.3) | 0.019 |
| Mean anal pressures, mmHg | | | |
| Maximal resting pressure | 50.1 (21.9) | 36.9 (19.5) | 0.001 |
| Maximal squeeze pressure | 220.1 (100.3) | 132.7 (55.4) | <0.001 |

Values are presented as mean (standard deviation) unless specified otherwise.
CCFIS, Cleveland Clinic Florida Fecal Incontinence Score

**Table 2.** Lower Urinary Tract Symptoms and Urinary Incontinence of the Study Population (n = 140).

| Variable | Men (n = 44) | Women (n = 96) | p-value |
|---|---|---|---|
| IPSS | 12.0 (8.0) | 7.5 (8.1) | 0.003 |
| Incomplete emptying | 1.3 (1.6) | 0.9 (1.6) | 0.146 |
| Frequency | 2.0 (1.6) | 1.4 (1.7) | 0.025 |
| Intermittency | 1.5 (1.8) | 0.7 (1.4) | 0.012 |
| Urgency | 1.7 (1.9) | 1.1 (1.6) | 0.034 |
| Weak stream | 2.4 (2.1) | 1.3 (1.8) | <0.001 |
| Straining | 1.4 (1.8) | 0.9 (1.6) | 0.074 |
| Nocturia | 1.5 (1.0) | 1.4 (1.2) | 0.696 |
| IPSS-quality of life | 3.4 (1.6) | 2.8 (1.8) | 0.059 |
| OABSS | 3.2 (2.1) | 3.8 (3.5) | 0.187 |
| Urination on waking | 0.4 (0.5) | 0.4 (0.5) | 0.918 |
| Urination on sleep | 1.5 (1.0) | 1.3 (1.0) | 0.409 |
| Urgency | 1.0 (1.3) | 1.2 (1.6) | 0.524 |
| Urge incontinence | 0.3 (0.8) | 0.9 (1.4) | <0.001 |
| Urinary incontinence, n (%) | 17 (38.6) | 61 (63.5) | 0.006 |
| Stress incontinence | 8 (18.2) | 22 (22.9) | 0.680 |
| Urge incontinence | 5 (11.4) | 9 (9.4) | 0.952 |
| Mixed incontinence | 4 (9.1) | 30 (31.3) | 0.009 |

Values are presented as mean (standard deviation) unless specified otherwise.
IPSS, International Prostate Symptom Score; OABSS, Overactive Bladder Symptom Score

men?" LUTS were evaluated separately for men and women. In addition, subgroup analyses were performed for the two age-groups: those aged ≤69 years and those aged ≥70 years.

### *Statistical analysis*

All statistical analyses were performed using the EZR software (version 1.11; Saitama Medical Center, Jichi Medical University, Saitama, Japan). Categorical variables are reported as frequency and percentage, whereas continuous variables are reported as mean and standard deviation. The distribution between the groups was analyzed using the chi-square test or Fisher's exact test, according to the sample size. Unpaired *t*-test was used to compare differences between the two groups. Correlations between variables were evaluated using Pearson's correlation coefficient. Statistical significance was set at $p < 0.05$.

## Results

During the study period, 194 patients presented to our hospital with complaints of FI, of whom, 140 met the eligibility criteria and were included in the study. Demographic information of the included patients is summarized in Table 1. Performance status based on the Eastern Cooperative Oncology Group criteria was 0 or 1 in all cases. There were no sex differences in the distribution of FI types. Passive FI was the most common FI type in both sexes, followed by mixed passive and urge FI. The mean CCFIS score was significantly higher in women than in men. Significant differences in the MRP and MSP were observed between the two sexes (Table 1).

The mean values of each LUTS parameter and prevalence of UI are shown in Table 2. The mean IPSS-QOL and OABSS scores did not differ significantly between the two sexes; however, the mean IPSS was significantly higher in men than in women (12.0 vs. 7.5). Among the IPSS, the values indicative of voiding symptoms such as a weak stream and intermittency were particularly high in men. The prevalence of UI was significantly higher in women than in

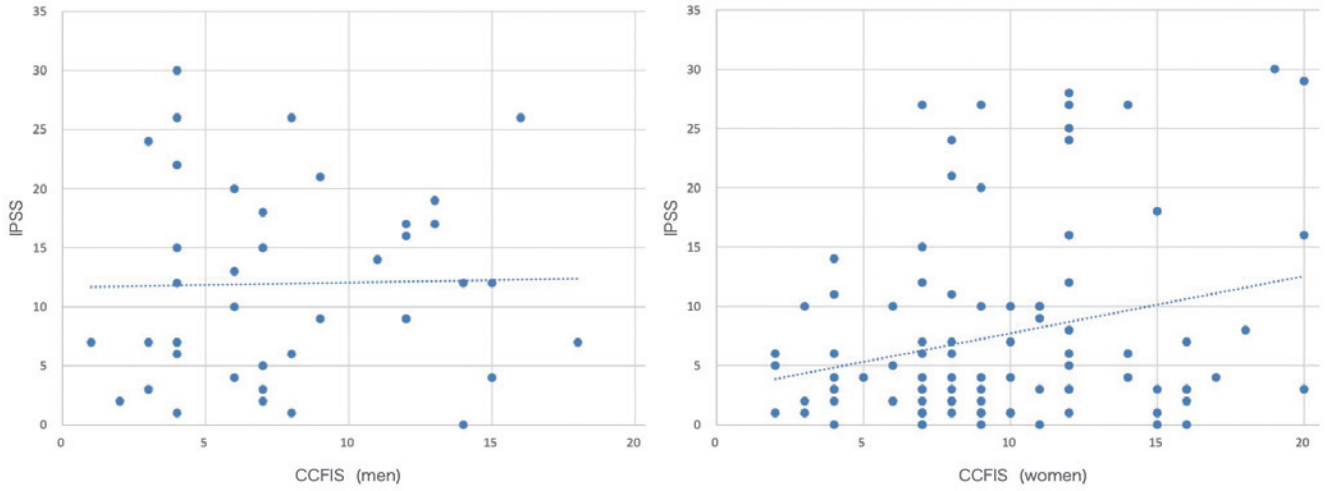


**Figure 1.** Correlation between International Prostate Symptom Score (IPSS) and Cleveland Clinic Florida Fecal Incontinence Score (CCFIS). There was a significant positive correlation between IPSS and CCFIS in women (r = 0.256, p = 0.012), but not in men (r = 0.023, p = 0.885).

**Table 3.** Lower Urinary Tract Symptoms and Urinary Incontinence of Men (n = 44).

| Variable | ≤ 69 years n = 10 | ≥ 70 years n = 34 | p-value |
|---|---|---|---|
| IPSS | 12.1 (9.0) | 11.9 (7.6) | 0.955 |
| IPSS-QOL | 2.8 (1.2) | 3.6 (1.7) | 0.153 |
| OABSS | 2.0 (1.6) | 3.6 (2.1) | 0.028 |
| Urinary incontinence, n (%) | 2 (20) | 15 (44.1) | 0.271 |
| Stress incontinence | 2 (20) | 6 (17.6) | 0.523 |
| Urge incontinence | 0 | 5 (14.7) | 0.100 |
| Mixed incontinence | 0 | 4 (11.8) | 0.559 |

Values are presented as mean (standard deviation) unless specified otherwise.
IPSS, International Prostate Symptom Score; QOL, quality of life; OABSS, Overactive Bladder Symptom Score

**Table 4.** Lower Urinary Tract Symptoms and Urinary Incontinence of Women (n = 96).

| Variable | ≤ 69 years n = 36 | ≥ 70 years n = 60 | p-value |
|---|---|---|---|
| IPSS | 6.8 (8.1) | 8.0 (8.1) | 0.492 |
| IPSS-QOL | 2.5 (1.7) | 3.0 (1.9) | 0.207 |
| OABSS | 2.4 (2.3) | 4.7 (3.8) | <0.001 |
| Urinary incontinence, n (%) | 21 (58.3) | 40 (66.7) | 0.411 |
| Stress incontinence | 10 (27.8) | 12 (20.0) | 0.380 |
| Urge incontinence | 1 (2.8) | 8 (13.3) | 0.013 |
| Mixed incontinence | 10 (27.8) | 20 (33.3) | 0.570 |

Values are presented as mean (standard deviation) unless specified otherwise.
IPSS, International Prostate Symptom Score; QOL, quality of life; OABSS, Overactive Bladder Symptom Score

men (63.5% vs. 38.6%, respectively). Comparison by UI type showed no sex differences in the prevalence of SUI and UUI; however, MUI was more common in women than in men (31.3% vs. 9.1%, respectively).

A correlation analysis of IPSS and CCFIS was performed to examine the impact of LUTS on patients with FI, and a significant positive correlation was found between IPSS and CCFIS in women, but not in men (Figure 1). Correlations between IPSS and anal pressures were also examined, but no significant correlations were found for either sex (Supplementary Files 1 and 2).

The results of comparing LUTS in the two age groups (≤69 years [n = 46] and ≥70 years [n = 94]) are shown in Table 3, 4. The IPSS and IPSS-QOL scores did not differ significantly between age groups for either sex. However, the OABSS was significantly higher in the older group than in the younger group for both sexes (Figure 2). The prevalence of UI did not differ significantly between age groups in either sex (Table 3, 4). However, among women, the prevalence of UUI was significantly higher in the older group than in the younger group (13.3% vs. 2.8%).

As a result, 78 (55.7%) of the 140 patients with FI had DI, and the prevalence of DI was higher in women than in men (63.5% vs. 38.6%; p = 0.006). There was no significant difference in the prevalence of DI between the age-groups (≤69 years, 50.0% vs. ≥70 years, 58.5%; p = 0.341), but UUI tended to be more common in the older group than in the younger group (Figure 3). When comparing anal pressures between patients with and without DI, the MSP of female patients with DI was significantly lower than that of patients with only FI (Table 5, 6).

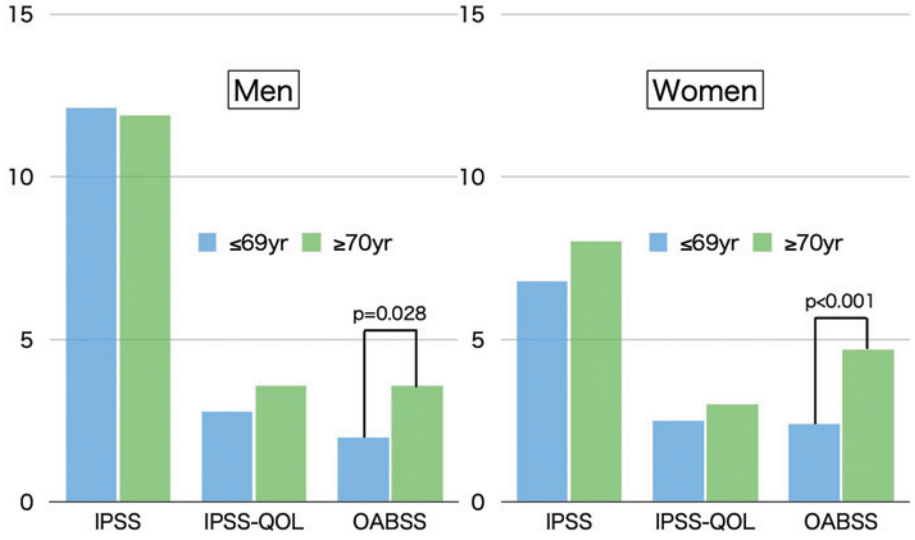


**Figure 2.** Comparison of International Prostate Symptom Score (IPSS), IPSS-quality of life (IPSS-QOL), and Overactive Bladder Symptom Score (OABSS) between patients aged ≤69 years and ≥70 years. The IPSS and IPSS-QOL did not differ significantly between the two age-groups. However, the OABSS was significantly higher in the older group than in the younger group, regardless of sex.

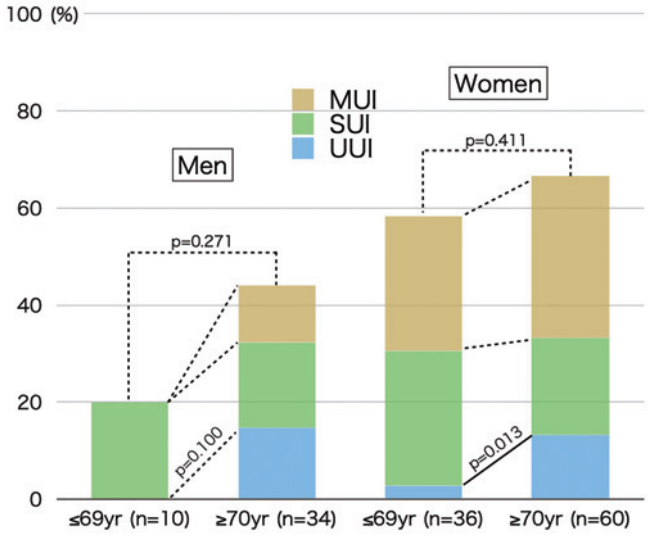


**Figure 3.** Prevalence of double incontinence (DI) in men (n = 44) and women (n = 96). Each color in the graph indicates the percentage of each type of urinary incontinence (UI): stress UI (SUI), urge UI (UUI), and mixed UI (MUI). There was no significant difference in the prevalence of DI between the age-groups for men (p = 0.271) and women (p = 0.411), but UUI tended to be more common in the older group than in the younger group (men, p = 0.100; women, p = 0.013).

## Discussion

This is the first study to investigate DI and LUTS in Japanese patients with FI. The results showed a high prevalence of DI (55.7%) in patients with FI and that DI was more common in women than in men. Regarding LUTS, voiding symptoms were more common in men, whereas storage symptoms, such as UI and MUI, were more common in women. By age, higher OABSS scores and more UUI cases were encountered in the older group than in the younger group for both the sexes. These results were consistent with those of previous community-based epidemiological studies[7-16].

Two large international community-based epidemiological studies on LUTS were conducted in Western countries[18,32]. According to the EPIC study[18], 66.6% of the women and 62.5% of the men had at least one LUTS. Of the LUTS, storage symptoms were more common in women than in men, and voiding symptoms were more common in men than in women. The most common symptom in both sexes was nocturia (≥1 per night), followed by urgency. According to the EpiLUTS study[32], the prevalence of LUTS occurring at least a few times per month was 76.3% for women and 72.3% for men. In a large survey of female LUTS conducted in China, 55.5% of the women had LUTS, and storage symptoms (53.9%) were more common than voiding symptoms (12.9%)[33]. Both storage and voiding symptoms increased with age, with nocturia being the most common symptom, followed by urgency. A community-based epidemiological study conducted in Japan reported that LUTS increased with age, with approximately 78% of those aged ≥60 years having some form of LUTS[21]. The most common symptoms in both sexes were nocturia (≥1 per night) and increased daytime frequency (≥8 per day),

**Table 5.** Comparison of Anal Pressures in Male Patients with and without Double Incontinence.

| Variable | Only FI (n = 27) | DI (n = 17) | p-value |
|---|---|---|---|
| Maximal resting pressure | 52.7 (22.3) | 45.9 (21.4) | 0.323 |
| Maximal squeeze pressure | 230.8 (77.1) | 203.0 (129.9) | 0.433 |

Values are presented as mean (standard deviation) unless specified otherwise.
FI, fecal incontinence; DI, double incontinence

**Table 6.** Comparison of Anal Pressures in Female Patients with and without Double Incontinence.

| Variable | Only FI (n = 35) | DI (n = 61) | p-value |
|---|---|---|---|
| Maximal resting pressure | 39.9 (20.1) | 35.2 (19.0) | 0.258 |
| Maximal squeeze pressure | 150.8 (59.8) | 122.4 (50.3) | 0.015 |

Values are presented as mean (standard deviation) unless specified otherwise.
FI, fecal incontinence; DI, double incontinence

followed by slow stream, feeling of incomplete emptying, and urgency in men and slow stream, SUI, and urgency in women[21]. In the present study involving patients with FI, urination on sleep had the highest OABSS score in both sexes, followed by urgency. The IPSS results also showed that both sexes scored higher in frequency and nocturia, followed by weak stream. Thus, the characteristics of LUTS in patients with FI were similar to the characteristics of those in the general population.

Epidemiological studies of UI have primarily focused on women. According to the 2005 International Consultation on Incontinence report[34], the prevalence of female UI ranged from 25-45% in most studies from 17 countries. Among the UI types, SUI accounted for approximately half (49%) of the cases, followed by MUI (29%) and UUI (21%). In a 2013 systematic review of epidemiological studies on female UI, the prevalence of UI ranged from 16.1-68.8% in 17 studies, and the most prevalent UI type was SUI[35]. In contrast, Slieker-ten Hove et al[12]. reported that SUI was the most common form of UI among those aged 45-65 years, while MUI was most common among those aged ≥65 years. Of the 19,293 women surveyed by Hirai et al[36], 5,160 (26.8%) had UI, with SUI being the most common (47.1%), but the proportion of UUI increased in those aged ≥60 years. Similarly, in our study, SUI was more common than UUI in patients aged ≤69 years, while an increase in UUI and MUI was observed in those aged ≥70 years. The development of UUI or MUI in the older population appears to be associated with cerebrovascular diseases, spinal diseases, Parkinson's disease, BPH in men, and POP in women[37,38].

Wu et al[15]. reported that, in a community-based population, UI was less common in men than in women (6.4% vs. 19.8%). With regards the form of UI, SUI was significantly less common in men than in women (3.1% vs. 37.8%), and the prevalence of UUI did not differ between men and women (17.1% vs. 18.4%)[15]. Similarly, in an epidemiological study in Japan, UUI was more common than SUI in men with UI[21]. Sex differences in UI may be attributed to female anatomic weaknesses such as a short urethra, weak urethral sphincter, and weak urethral support structures, as well as weakened pelvic floor muscles due to pregnancy, vaginal delivery, and estrogen deficiency[37].

The prevalence of DI in community-based epidemiological studies was reported to range from 1.0% to 7.8% in men and from 2.0% to 10.4% in women, and the prevalence of DI among subjects with FI ranged from 20.3% to 73.3% in men and from 43.4% to 82.0% in women (Table 7)[7-16]. The reported risk factors for DI include advanced age, depression, frailty, comorbidities, white race, and multiple parity[14-16,29,39]. In contrast, black race is associated with a decreased risk of DI[14]. The pelvic floor is a complex neuromuscular unit that plays key roles in the storage and passage of urine and feces and supports the pelvic organs. Therefore, pelvic floor symptoms such as LUTS, defecation problems, sexual problems, pelvic pain, and POP may co-occur with pelvic floor muscle weakening due to aging, vaginal delivery, or comorbidities[40]. LUTS has been reported to be associated with bowel symptoms other than FI, including irritable bowel syndrome, loose stool consistency, low stool frequency, and defecation difficulty[41-43]. These clinical correlations between LUTS and lower bowel function suggest a shared pathophysiology, including neurological mechanisms and pelvic floor weakness. In this study, IPSS and CCFIS showed a significant positive correlation in women but not in men. The reason for this may be that voiding symptoms associated with BPH, rather than pelvic floor weakness, contributed to a higher IPSS in men.

The limitations of this study include its retrospective, single-institution, and observational design, with no control group. Another limitation is that the severity of DI and LUTS was not evaluated because our purpose was to explore their prevalence. In addition, the prevalence of DI may have been underestimated because our facility does not have a urology or gynecology department. This is because patients with DI with more severe UI than FI may visit a urologist, whereas patients with DI with more severe POP may visit a gynecologist. Therefore, these results need to be validated in multicenter studies that include both urological and gynecological patients.

In conclusion, the characteristics of LUTS and UI in patients with FI were comparable to their characteristics in the general population, regardless of sex. However, the prevalence of DI was much higher among the patients with FI than among the general population. Recently, targeted intervention programs, such as pelvic floor physical therapy and

**Table 7.** Prevalence of Fecal, Urinary, and Double Incontinence from the Literature in Community-Based Population.

| Author (years) | Nakanishi (1997) [8] | | Roberts (1999) [9] | | Edwards (2001) [10] | | Teunissen (2004) [11] | | Markland (2008) [7] | | Slieker-ten Hove (2010) [12] | Rortveit (2010) [13] | Matthews (2013) [14] | Wu (2015) [15] | | Luo (2020) [16] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subjects (n) | 1,405[a] | | 1,540[b] | | 2,818[a] | | 5,748[b] | | 986[a] | | 1,397[b] | 2,106[c] | 64,396[b] | 7,101[a] | | 1,250[c] | |
| Mean age | NS, ≥65 | | 66.3 | 65.9 | NS, ≥65 | | NS, ≥60 | | 75.3 | | 58.0 | 55.6 | 72.7 | NS, ≥50 | | 72.7 | |
| Ethnicity | Asian | | Western | | Western | | Western | | Western | | Western | Western | Western | Western | | Asian | |
| Sex (M/F) | M | F | M | F | M | F | M | F | M | F | F | F | F | M | F | M | F |
| Any FI (%) | 8.7 | 6.6 | 11.1 | 15.2 | 1.4 | 3.7 | 7 | 6 | 12.3 | 11.8 | 13.8 | 5.5 | 11.6 | NS | NS | 11.8 | 12.7 |
| Only FI (%) | NS | NS | NS | NS | 0.4 | 1.2 | NS | NS | 7.7 | 3.9 | 3.6 | 2.5 | 4.3 | 8.4 | 8.2 | 4.0 | 2.3 |
| Any UI (%) | 9.8 | 9.8 | 25.6 | 48.4 | 18.1 | | 9 | 29 | 26.8 | 40.8 | 58.8 | 28.6 | 45.0 | NS | NS | 46.6 | |
| Only UI (%) | NS | NS | NS | NS | 16.1 | | NS | NS | 22.2 | 32.9 | 48.6 | 25.5 | 37.8 | 6.4 | 19.8 | 37.3 | |
| DI (%) | 3.4 | 2.0 | 5.9 | 9.4 | 1.0 | 2.5 | 2 | 4 | 4.6 | 8.0 | 10.2 | 3.0 | 7.2 | 1.9 | 6.0 | 7.8 | 10.4 |
| DI/any FI (%) | 69.4 | 73.2 | 51.1 | 59.6 | 73.3 | 68.3 | NS | NS | 37.7 | 67.2 | 74.1 | 55.2 | 62.6 | 20.3 | 43.4 | 66.2 | 82.0 |

[a]Interview at home; [b]Postal questionnaire; [c]Interview at the clinic; NS, not stated; M, male; F, female; FI, fecal incontinence; UI, urinary incontinence; DI, double incontinence

antimuscarinic medications, have been devised that can be effective for both FI and UI[39,44]. However, the overall rate of medical consultations for LUTS is reported to be as low as 18.0%, and is especially low at 9.0% among women[21]. Therefore, healthcare providers should be aware that half or more patients with FI have concomitant UI and should aim for early detection and prompt treatment of patients with DI.

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Conflicts of Interest

There are no conflicts of interest.

Author Contributions

Tatsuya Abe contributed to the concept, design, data acquisition and analysis, and drafted and revised the manuscript. Seiji Matsumoto contributed to the concept, design, and analysis; revised the manuscript; and approved the final version. Masao Kunimoto, Yoshikazu Hachiro, Shigenori Ota, Kei Ohara, Mitsuhiro Inagaki, Yusuke Saitoh, and Masanori Murakami contributed to the data acquisition, revised the manuscript, and approved the final version.

Approval by Institutional Review Board (IRB)

This research was approved by the Institutional Review Board of Kunimoto Hospital (approval code: K23-004) and the Asahikawa Medical University Ethical Committee (No. 1355).

Disclaimer

Tatsuya Abe is one of the Associate Editors of Journal of the Anus, Rectum and Colon and on the journal's Editorial Board. He was not involved in the editorial evaluation or decision to accept this article for publication at all.

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## Supplementary Files

**Supplement File 1.** Correlation between International Prostate Symptom Score (IPSS) and maximal resting pressure (MRP) or maximal squeeze pressure (MSP) in men. No significant correlations were found between IPSS and MRP (r = 0.147, p = 0.340) or between IPSS and MSP (r = 0.048, p = 0.759).

**Supplement File 2.** Correlation between International Prostate Symptom Score (IPSS) and maximal resting pressure (MRP) or maximal squeeze pressure (MSP) in women. No significant correlations were found between IPSS and MRP (r = 0.145, p = 0.158) or between IPSS and MSP (r = 0.044, p = 0.671).

Please find supplementary file(s);
http://dx.doi.org/10.23922/jarc.2023-040