Epidemiology of Urinary and Fecal Incontinence

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1.1 Urinary Incontinence

Urinary incontinence (UI) has been defined by the International Continence Society (ICS) as the involuntary leakage of urine [1]. This is subcategorized into different types, including stress urinary incontinence, urge(ncy) urinary incontinence, mixed urinary incontinence, nocturnal enuresis and continuous urinary incontinence. Within the context of overall urinary function, urinary incontinence is often considered to be part of the broader constellation of lower urinary tract symptoms (LUTS). Although the ICS classification of LUTS can be useful, there can be an overlap between symptomatic components, which has led to placing incontinence symptoms into a separate analytic category [2]. Another important issue in the study of urinary incontinence epidemiology is an extensive sexual gap in the published literature. The propensity of published research focuses on urinary incontinence in women, with much less emphasis regarding urinary incontinence in men. One of the reasons may be that most studies on voiding symptoms in men tend to focus on more traditional definitions of LUTS, which do not include urinary incontinence in the conceptual model. Another reason may be the higher prevalence of urinary incontinence in women than in men.

Wide variation exists in prevalence estimates of urinary incontinence in men. Recently, the International Consultation on Incontinence reported that prevalence estimates range from 1% to 39% [3]. The wide span in estimates can be explained by differences in the methods used, including variation in populations (sampling, age range, ethnicity) questions, response options and definitions, as well as participation

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rates [3, 4]. However, clinically relevant estimates are far from 39% in the general population. Using the US National Health and Nutrition Examination Surveys (NHANES) data of the years 2005–2006 and 2007–2008 [5], authors reported that moderate or severe urinary incontinence prevalence was 4.4% [3.6–5.3%] among men. Any urinary incontinence was reported by 12.9%, and corresponding prevalence by urinary incontinence type was 2.5%, 10.3% and 2.7% for stress, urgency and mixed urinary incontinence, respectively. A US Internet-based panel survey examined differences in LUTS between different racial/ethnic groups [6]. Urgency urinary incontinence was reported by 6% of Whites compared with 10% of African-Americans. Authors reported prevalence of stress urinary incontinence was 6% in Afro-American and 2% for Caucasian white males. However, how much these differences really are due to 'racial' or 'biological' differences remain unclear. Overall, all these studies are confirmatory to earlier studies reporting dominance of urgency-type urinary incontinence in men, compared with stress-type urinary incontinence dominance in women [5, 6].

Several earlier studies have shown a significant increase in prevalence of urinary incontinence related to age and comorbidities [3]. An Austrian population-based study assessed prevalence of urinary incontinence in a geriatric cohort (mean age 76 years) of the general population [7]. Any involuntary urine loss at least twice a week was reported by 26% of elderly men. The EpiLUTS study examined rates of urinary incontinence in both men and women in the USA, the UK and Sweden [8]. Prevalence of any urinary incontinence was 46% for men and 68% for women. However, this actually included various forms of urinary symptoms, such as post-micturition dribble was mainly categorized as urinary incontinence, which is questionable and not consistent with current ICS terminology. One more reason for such high estimates was use of only two response options: yes or no. When categorized by type, 5.6% of men reported urgency urinary incontinence, 0.8% stress urinary incontinence and 1.4% mixed urinary incontinence. The 6.3% of these patients had urgency urinary incontinence associated to another form of urinary incontinence, and 1.2% had stress and another form of urinary incontinence.

A number of recent studies have examined the risk factors and other comorbidities most commonly associated with development of male urinary incontinence [3]. Substantial impairments in physical condition are associated with urinary incontinence, particularly in elderly patients. However, the direct influence of walking and other physical activity on continence status can be difficult to assess. A Japanese study on 683 old-aged men and 298 elderly women examined habitual activity levels, including walking and moderate to vigorous physical exercise [9]. The International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF) was used to classify degree of incontinence for each individual. Prevalence of urinary incontinence was 7% in men and 28% in women. Individuals who walked regularly had significantly lower rates of urinary incontinence than those who performed less vigorous regular exercise. These findings indicate that regular physical activity appears to reduce risk of urinary incontinence. Other studies have linked urinary incontinence to both falls and physical limitations [10].

Stroke is one of the leading causes of both death and chronic disabilities, particularly in developed nations. Urinary incontinence is extremely common after stroke. An Australian study examined the natural history of urinary incontinence in a group of 1248 patients after stroke [11]. Rates of urinary incontinence after first stroke at 3 months were lower in men (30%) than in women (58%). This trend continued at 12 months, with 25% of men and 51% of women reporting urinary incontinence. Overall, 35% of those who reported de novo urinary incontinence after stroke experienced complete resolution of urinary incontinence by 12 months. Greater stroke severity was associated with higher incidence and lower resolution rates of urinary incontinence.

Rates of comorbidity increase with advancing age, and many conditions can be associated with development of urinary incontinence. A Taiwanese study of 2629 community-dwelling older adults examined associations between diabetes and various geriatric conditions and syndromes [12]. The study examined 1369 men, including 1162 with diabetes and 207 controls. Overall prevalence of urinary incontinence in men with diabetes was 22% compared with 14% of those without. In the multivariate analysis (urinary incontinence as the outcome), the OR was 1.6 (95% CI 1.1–2.5) for diabetes.

Numerous medications have been associated with risk of development of urinary incontinence. A population-based epidemiological study examined this issue using Boston Area Community Health (BACH) survey data [13]. The overall prevalence of urinary incontinence was 4.6% in men and 9.0% in women. Among men, urinary incontinence prevalence was noted to be highest among those who used either an angiotensin II receptor blocker (22%) or a loop diuretic (19%). However, after adjusting for potential covariates, only anticonvulsant medications remained significant (OR 2.5; 95% CI 1.2–5.0).

In men stress urinary incontinence most commonly occurs after prostatectomy for benign or malignant disease. Despite improvements in surgical techniques and implementation of minimally invasive procedures, the reported prevalence of post-radical prostatectomy (RP) SUI varies widely, ranging 4–50% in contemporary series [14, 15]. On the contrary, the prevalence of SUI following transurethral resection of the prostate (TURP) and holmium laser enucleation of the prostate (HoLEP) is much less common (approximately 1%) [16]. However, TURP performed in the setting of prior external beam irradiation or brachytherapy can result in particularly high incontinence rates of up to 18% [17]. The observed discrepancy in the published post-radical prostatectomy SUI rates results from differences in definition of incontinence used by different authors, data collection methodology and evaluation outcomes (patient versus surgeon-reported continence). Although small degree of SUI may not affect patient's well-being, moderate-to-severe post-prostatectomy incontinence negatively impacts men's quality of life [18]. The most common mechanisms of SUI after radical prostatectomy include a direct injury to the urethral sphincter itself as well as to adjacent supportive tissues and nerves [19]. Whereas after TURP urinary incontinence is most likely due to the pre-existing abnormalities of bladder function rather than direct sphincter injury [17]. Improvements in urinary leakage may occur spontaneously or with conservative

measures within the first 12 months after prostatic surgery. However, management of persistent incontinence is often challenging and may be frustrating for both a patient and his doctor, and as a consequence, it can negatively affect doctor–patient relationship.

Epidemiological research has focused less attention on urinary incontinence in men compared with women. This may be due in part to conceptual definitions of lower urinary tract dysfunction in men, which often concentrate on storage and voiding, and may not routinely include urinary incontinence. Ongoing research shows high prevalence of urinary incontinence among elderly people in developed countries, and emerging data indicate that this is a problem in other parts of the world as well. A wide variety of risk factors have been identified, and urinary incontinence can have substantial negative impacts on clinical outcomes and quality of life.

Interdisciplinary Comment
Epidemiology of urinary incontinence in the male has not been investigated to the same extent as for the females. Rates of urinary incontinence continue to be reported in men and women by 1: 2 ratio. In this context it is clear that a pelvic floor surgery involving the sphincter unit is at risk for the development of urinary or faecal incontinence. For a better estimate of the prevalence of urinary and faecal incontinence in the male, a uniformity of the concept of incontinence is essential. Specially in anal and faecal incontinence the range of severity of the dysfunction is so broad, as stated by Ramin and Ganns, that even when episodes of loss of air or stools are quite rare, the quality of life is severely compromised, and both epidemiologic evaluation and therapy are difficult tasks.

1.2 Fecal Incontinence

Fecal incontinence (FI) is defined by the unintentional and recurrent loss of fecal material for at least 1 month's duration in an individual with a developmental age ≥4 years [20], whereas anal incontinence (AI) includes leakage of gas and/or stool [21]. Involuntary passage of flatus alone should not be included in the definition of FI, partly because it is difficult to determine when the gas leakage is abnormal [22]. Major incontinence is defined as soiling of underwear, outer clothing, furnishings, or bedding several times a month or more often [23].

These multiple terminologies have made it difficult to perform an accurate cross-national comparison between studies conducted in the area [24]. Moreover, unless specifically questioned, most people with FI will avoid reporting the condition to a healthcare provider [25]. This has led to an underestimation of the prevalence and consequences of incontinence, to an incomplete knowledge of its biological causes and to limited efforts on disease prevention [21]. Few data are also available on its

economic burden in the United States, whereas FI is associated with substantial economic cost, calling for more attention to its prevention and effective management [26].

Incontinence can lead to both physical (e.g., perianal dermatitis, infections, sores) and psychosocial consequences—the latter being mostly reported as overwhelming. In fact, this condition can have a deleterious impact on personal and social life, affecting self-esteem and potentially leading to social isolation (due to the anxiety of having unexpected episodes), health-related unemployment and even institutionalization [27–29].

A workshop was organized in August 2013 by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), in order to address issues regarding epidemiology, pathophysiology, and management of fecal incontinence [30]. Among the findings of this workshop, a selection bias was encountered in many studies that evaluated the prevalence of this condition, as they were often conducted in selected populations (restricted by age, residence, or underlying disease) [30]. In fact, the prevalence of FI in nursing home residents and in older age groups is known to be considerably higher than in the general population, approaching 47% in a survey of 18,000 nursing home residents in Wisconsin [31]. Three studies in community-dwelling elderly population (≥65 years) reported no difference between men and women [32–34], one a higher prevalence in men [35], and another a higher prevalence in women [36]. However, the true frequency of FI is often underestimated even in this selected population, as healthcare providers seldom investigate the presence of the disease and patients hide the problem from their families, friends, and often their doctors [21, 30].

Population-based studies avoid the referral bias of single-institution-based studies. A review of community-based studies performed between 1992 and 2009 showed a wide difference in prevalence rates [30], ranging from 4.5% to 12.8% [32, 37]. Gross fecal incontinence in the overall male population was reported at a prevalence of 0.4–1.4% [23, 38], while minor incontinence ranges between 6.2% and 9.7% [23, 39]. In a cross-sectional prevalence study in the general population [23], major incontinence was reported in 1.4% of the respondents (0.9% of adults aged 40–64 years and 2.3% of adults aged 65 years), leading to an impaired quality of life in 51.7% of them. In another survey, 33% of patients restricted activities due to incontinence [40].

As stated by Perry et al., the prevalence of FI is strongly associated with age, raising from approximately 4% for any incontinence in men and women aged between 40 and 49 years old to 11.6% in patients aged ≥80 years [23]. A correlation between severity of the disease and older age has also been emphasized: in fact, the oldest age group (80+ years) reported greater soiling than younger age groups [23]. Since FI is strongly associated with age, its incidence will likely increase as the population ages [21].

Data supporting a greater risk of FI in females are still inconclusive [23]. In the population-based study by Perry et al., the frequency of leakage and the prevalence rate of soiling did not differ between men and women, whereas the proportions reporting staining of underwear were higher in men than in women (9.6% vs 7.5%) [23].

In conclusion, fecal incontinence is a relatively common disorder with significant psychosocial implications, often impairing quality of life. Despite the basic understanding of this disease, FI remains an understudied condition, necessitating further clinical research on its epidemiology, pathophysiology, social consequences, and ultimately prevention and management.

Interdisciplinary Comment

The real prevalence of fecal incontinence in the male is lacking due to the absence of an agreement on the grade of incontinence as indeed it happens for urinary incontinence.

Most likely one of the causes is the lack of knowledge of the pathophysiology of fecal continence and of related incontinence symptoms.

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