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The analysis of risk factors associated with women's urinary incontinence; literature review

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ABSTRACT



Urinary incontinence (UI) is a common condition among women. Approximately 50% of them had an involuntary loss of urine at least once in their lifetime. It can be present during sexual activity, contributing to sexual dysfunction and often associated with anxiety or even depression, thus having a negative impact on the quality of life. The incidence of UI is related to the existence of predisposing factors. The best known are: age, weight, family history, race/ ethnicity, number of pregnancies and mode of birth, history of genitourinary interventions and factors related to ordinary habits: smoking, caffeine consumption, oral contraceptives. Studies on middle-aged women have revealed that BMI, parity, age, hysterectomy, smoking, race/ ethnicity and diabetes are factors often associated with urinary incontinence. Future studies are needed to further explore the risk factors for urinary incontinence.

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Introduction

Urinary incontinence (UI) is common and mainly undertreated [1,2]. About 50% of adult women suffer from this condition, but only some of them require medical care [3-5]. The overall prevalence of urinary incontinence among non-pregnant women over the age of 20 has been reported to range from 10 to 17% [6]. Prevalence rates above 50% have been reported in women over 65 years of age [7].

However, not all women who develop urinary incontinence will have symptoms indefinitely. In a longitudinal cohort study of 4,127 middle-aged women, the annual incidence rate of urinary incontinence was 3.3% and the annual remission rate was 6.2%. Factors associated with persistent (unresolved) symptoms were weight gain and menopause [8].

Urinary incontinence can combine anxiety and depression, thus having a negative impact on the quality of life [9, 10]. It can be present during sexual activity (coital incontinence), contributing to sexual dysfunction related to incontinence [11]. Medical morbidities associated with this

condition include perineal infections caused by moisture and irritation. Urinary incontinence is not associated with increased mortality [12].

Risk factors for urinary incontinence are [13-17]:

- Age – it is the most important risk factor; the prevalence and severity of incontinence increase with age.
- Obesity - its presence increases 3 times the risk of urinary incontinence.
- Parity - increased parity favors incontinence and genital prolapse.
- Birth mode - vaginal birth, compared to Cesarean sections, more often associates stress urinary incontinence.
- Family history
- Ethnicity/ race
- Other factors - smoking, caffeine use, diabetes, stroke, depression, fecal incontinence, menopausal urinary tract syndrome/ vaginal atrophy, hormone replacement therapy, genitourinary surgery (e.g. hysterectomy) and radiotherapy.

Depending on the mechanism of occurrence, urinary incontinence is classified as [18-23]:

- Stress urinary incontinence - involuntary leakage of urine that occurs with increasing intra-abdominal pressure (e.g. exertion, sneezing, coughing, laughing) outside of bladder contraction. It occurs frequently in women with prior births at an early age, with the highest incidence between 45 and 49 years.
- Urgent urinary incontinence - incontinence felt in the form of an urgent need to empty the bladder; it contracts involuntarily, and the urethral orifice opens, excreting urine; this may be secondary to neurological disorders (spinal cord injury), bladder abnormalities, growth or change in the microbial flora of the bladder, or it may be idiopathic.
- Mixed urinary incontinence - has symptoms of stress and urgent incontinence; may occur after surgery (hysterectomy, Cesarean section).

Another classification of urinary incontinence differentiates two more types:

- Urinary incontinence due to overflow - continuous urinary discharge or urinary dribbling during the incomplete emptying of the bladder. Associated symptoms include weak or intermittent urinary flow, nocturia, frequent and hesitant urination [24]. When the bladder is full, stressful urinary leakage may occur or small-amplitude bladder contractions may be triggered. Overflow incontinence is caused by the hypomotility of the detrusor or bladder obstruction. Studies suggest that the contractility and effectiveness of the detrusor decrease with age [25]. Severe detrusor hypomotility occurs in approximately 5-10% of older adults [26]. The etiology of detrusor hypomotility include damage to smooth muscles from acute, chronic or severe bladder over-distension, Fowler syndrome, fibrosis, low estrogen levels [27].
- Neurogenic (reflex) urinary incontinence - bladder dysfunction due to a neurological disorder affecting the brain or spinal cord: multiple sclerosis or stroke, peripheral neuropathy (secondary to diabetes, vitamin B12 deficiency or alcoholism), spinal lesions [28-30].

Discussions

In comprehensive surveys on groups of non-pregnant women, urinary incontinence was present in 3% of adult women under the age of 35, 7% for the 55-64 age group and 38% for women over the age of 60 [31]. However, studies reveal that age cannot be an independent risk factor for incontinence [28-32].

Reducing body weight in obese patients is associated with improving and resolving urinary incontinence, especially stress urinary incontinence (SUI). Several

observational studies have reported a reduction of over 50% in stress urinary incontinence after bariatric surgery-induced weight loss [33-36].

Although multiparity is considered a risk factor, nulliparous people report disturbing urinary incontinence [37,38].

The mode of birth influences the occurrence of incontinence, but multicentered studies have shown that Cesarean deliveries does not protect women from urinary incontinence [39-43].

The family history of incontinence was analyzed by Hannestad YS et al. who found that the risk was increased for both the daughters and sisters of women with urinary incontinence [22, 44].

Other studies have looked into the relationship between race/ ethnicity and the occurrence of urinary incontinence. The results showed a higher prevalence among non-Hispanic white women compared to African American women [45-49]. Other studies do not report differences between racial/ ethnic groups [50-53].

O'Halloran T et al. analyzed the rate of UI among nulliparous women, the impact on the quality of life and its association with certain risk factors. They selected a sample of nulliparous Australian women aged 16 to 30 years and conducted a cross-sectional, self-administered study based on questionnaires applied in medical clinics and university campuses [6]. Out of the 1,620 questionnaires, 1,002 provided analyzable data. The average age of the participants was 22.5 years. UI rates varied depending on the sexual activity and the use of combined oral contraceptives (COCs). Women with UI reported significantly lower overall well-being than women without UI and associated more frequently with symptoms related to anxiety and depression [54].

Nurses' Health Study II is a project that began in 1989 and was based on questionnaires mailed to women between the ages of 25 and 42 in 14 US states. Follow-up questionnaires are sent every two years to update lifestyle and health information. The urinary incontinence data were first requested in 2001. Tracking remains high, reaching up to 90% nowadays [55-57]. The study was approved by the Institutional Review Board of Brigham and Women's Hospital. The authors defined two groups of cases: a group of women who reported occasional urine loss 1 to 3 times a month and a second group of women with frequent urine loss, at least once a week. They considered severe UI a quantitative (sufficient to wet underwear) and frequent loss of urine. This definition was based on a validated severity index, which correlates well with buffer weights [58-62]. Women who did not meet the definition of the relevant case or control were not included in this analysis. Being a cross-sectional study, the authors tried to reduce the probability of inverse causation by imposing a short delay between the ratio of risk factors and incontinence. A delay period of 2

years was chosen, because it was not desired to assess the risk factors at a distance from the occurrence of UI [63-66]. Parity, the history of the use of oral contraceptives and the consumption of tobacco are data obtained by means of the questionnaires from 1989-1999. The BMI was calculated with self-reported height in 1989 and 1999. Race and ethnicity information was obtained in 1989, when participants were asked to mark one of the answer options "Southern Europe/ Scandinavia/ others", respectively "white/ black/ Hispanic/ Asian/ other race" in the questionnaire. In each questionnaire, participants reported whether they were diagnosed with diabetes or had any history of hysterectomy. The study found that responses to health questionnaires, including those that reported type 2 diabetes, are extremely valid. The results show that 43% of the women had lost urine at least once a month [67-69].

People between the ages of 50 and 54 are twice as likely to develop severe incontinence as those under the age of 40. Chiarelli et al. found a 36% prevalence of UI in a group of 14,070 Australian women aged 45 to 50 years [68]. In a review of 13 general population studies, Hunskaar et al. reported a prevalence of incontinence of 30% to 40% among middle-aged women [69].

White women were more likely to have UI than black women or Asians. No significant differences were found between white and Hispanic women, as observed by other authors [70-74].

The BMI has been strongly associated with incontinence. In a comparison of obese women with BMI ≥ 30 kg/m² and those with BMI between 22 and 24 kg/m², the chances of occasional incontinence were 2 times higher for the first group, increasing 3 times the probability of severe incontinence. Women with a BMI < 22 kg/m² have a significantly reduced chance of incontinence [75]. Noblett et al. found strong correlations between the BMI and intra-abdominal pressure and intravesical pressure, suggesting that obesity may cause a chronic state of increased pressure that is also felt in the pelvic floor [72]. Massive weight loss in women with morbid obesity has been associated with a decrease in stress incontinence (prevalence of 61.2% before bariatric surgery compared to the prevalence of 11.6% after stabilization of weight loss) [76-78].

Type 2 diabetes has been associated with a moderate but statistically significant increase in the possibility of frequent or severe incontinence. Hyperglycemia is correlated with increased urine volume and detrusor overload; microvascular complications of diabetes can affect the innervation of the bladder and alter the muscular function of the detrusor [78].

Parity was positively associated with incontinence. Women with 2 previous births are 67% more likely to develop UI than women with no births [24,36]. Cesarean

delivery can prevent trauma to the muscles and connective tissue in the pelvic floor, pudendal and pelvic nerve injuries that are associated with vaginal birth [70,73].

A history of hysterectomy is associated with a significant increase in incontinence. Hysterectomy could be a marker of pelvic floor dysfunction. In a meta-analysis of 11 observational studies, Brown et al. observed a significant increase in the chances of incontinence after hysterectomy in women over 60 years of age (but not in those under 60 years of age), suggesting that hysterectomy may have long-term effects on UI, but not long-term short [16,20,34,45].

Smoking has statistically significant links with both frequent and severe incontinence. There are many potential ways in which smoking can affect continence: smoker's cough can damage the mechanism of the urethral sphincter, decreased collagen synthesis that is associated with smoking can weaken pelvic support structures, and smoking-related diseases (such as vascular disease, asthma) and obstructive pulmonary disease) may have indirect or direct effects on bladder and urethral functions [31,77,79].

In similar studies performed on young and middle-aged women who used similar definitions of incontinence to the previous study, prevalence reports were consistent with those observed by Kim N. Danforth et al [71].

Conclusions

Given the lack of epidemiological or biological data on incontinence in different racial or ethnic groups, it is difficult to conclude why the findings on race and ethnicity may vary from study to study. Further research is needed.

Obesity, hysterectomy and type 2 diabetes are the most influential risk factors in most studies.

Studies on middle-aged women have shown that BMI, parity, age, hysterectomy, smoking, race, ethnicity and diabetes are factors often associated with urinary incontinence.

Future studies are needed to further explore the risk factors for incontinence.

Conflict of interest disclosure

There are no known conflicts of interest in the publication of this article. The manuscript was read and approved by all authors.

Compliance with ethical standards

Any aspect of the work covered in this manuscript has been conducted with the ethical approval of all relevant bodies and that such approvals are acknowledged within the manuscript.

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