The Epidemiology and Population-Based Studies of Women with Lower Urinary Tract Symptoms: A Systematic Review

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ABSTRACT
In this systematic review, we focused on epidemiology and population-based studies to identify recent real-world data of women with lower urinary tract symptoms. The PubMed, Scopus, and Cochrane databases were used for the literature search using the following keywords: epidemiology, population-based studies, women, female, lower urinary tract symptoms, and urinary incontinence. A total of 20 articles in the English language were found to be eligible for this review. The prevalence of LUTS in women was 11.8%-88.5%. The prevalence of storage symptoms was 23.6%-79%, voiding symptoms was 1.8%-51%, and post-micturition symptoms was 0.3%-46%. The prevalence of voiding and storage symptoms was 8.3%-26.6% and the prevalence of combined voiding, storage, and post-micturition symptoms was 6.6%-19.2%. Any incontinence was observed in 5.8%-45.8% of women. The majority of patients suffered from stress urinary incontinence with 1.9%-31.8%. The prevalence of urgency urinary incontinence and mixed-type urinary incontinence was 0.7%-24.4% and 2.1%-12%, respectively. Increased age, marital and work status, comorbidities, alcohol consumption, higher parity, vaginal delivery, instrumental delivery, prolonged labor, laceration, and postmenopausal status were found to be risk factors for lower urinary tract symptoms. The prevalence of lower urinary tract symptoms is increasing, especially with age. Since the worldwide prevalence of lower urinary tract symptoms remains unknown, multi-continental studies, especially in the developing world, with less heterogeneity and more standardized definitions, are needed to better evaluate real-world data in women with lower urinary tract symptoms.

Keywords: Epidemiology, female, lower urinary tract symptom, population-based studies

Introduction

Lower urinary tract symptoms (LUTS) in women are classified as storage symptoms, voiding symptoms, and symptoms after micturition. The most common storage symptoms are urinary frequency, urgency, incontinence, and nocturia, and the most common voiding symptoms are hesitancy, weak stream, splitting or spraying, intermittency, and straining. A feeling of incomplete emptying and post-micturition dribble are the most common post-micturition symptoms.1,2

These symptoms affect patients’ quality of life (QoL), and nearly a million women suffer from LUTS worldwide.3 In a multi-center study, the prevalence of “sometimes” LUTS in women was 76.3% and “often” LUTS in women was 52.5% based on the usage of International Continence Society (ICS) definitions.4 Similarly, a recent internet-based survey showed that the prevalence of LUTS in women over 40 years was 66%.3

The definition of LUTS, the selection and exclusion criteria of patients, and heterogeneity are the most common difficulties for evaluating the real impact of LUTS. In this systematic review, we focused on epidemiology and population-based studies to identify recent real-world data for women with LUTS.

Materials and Methods

This study complied with the Preferred Reporting Items for Systematic Reviews and Meta-analyses statement for conducting systematic reviews and we also followed the “Synthesis Without Meta-analysis (SWiM) protocol” for this review.
Eligibility Criteria
According to the PICo (Population, Interest and Context) tool, the population should include women over 18 years of age. The prevalence of LUTS in women is the main interest. The context of this review was the whole world. All population-based studies about LUTS were reviewed. Studies that questioned the prevalence of women (over 18 years old) with LUTS were included in this review. Studies that addressed patients under 18 years old, including only male patients, questioned the treatment effect of LUTS, and focused only on urinary incontinence (UI) were excluded from the final review.

Information Sources and Search Strategy
Systematic research was conducted between January and August 2021. The PubMed, Scopus, and Cochrane databases were used for the literature search using the following keywords: epidemiology, population-based studies, women, female, lower urinary tract symptoms, and UI. All filters were turned off while searching PubMed. Studies were reviewed and data were extracted by 2 authors (A.T. and Ö.B) independently. We did not use any automated tools.

Data Items and Study Risk of Bias Assessment
Primarily, the prevalence of LUTS in women was reviewed. The combined and separate prevalence of voiding, storage, and post-micturition symptoms was also reviewed. The studies that mentioned the prevalence of LUTS and incontinence were also reviewed. Study risk of bias and quality assessment were done using an “assessing risk of bias in prevalence studies” tool.

Synthesis Methods
According to SWiM guidelines, summarizing effect estimates methods were used. Structured tables were used to evaluate the prevalence of LUTS, the combined and separate prevalence of voiding, storage and post-micturition symptoms, and incontinence.

Results

Search Results
A total of 3155 articles were selected. Both observational and population-based studies were included. Abstracts, posters, editorials, and review articles were excluded. After which 738 articles with full text were reviewed and included in the final analysis. A total of 20 articles in the English language were found to be eligible for this review (Figure 1).

Study Risk of Bias and Quality Results
The assessment of quality and bias are shown in Table 1. According to this tool, all included studies had a low risk of bias.

Prevalence of Lower Urinary Tract Symptoms in Women
The prevalence of LUTS in women was 11.8%-88.5% based on a variety of definitions (Table 2). Based on definitions, type of questionnaire, and heterogeneity of the population, the prevalence of LUTS in women differed between studies. Most of the studies used the ICS definitions, but cut-off scores for the International Prostate Symptom Score (IPSS) and American Urological Association symptom index were also used. Different validated questionnaires were used, and some authors also used the “Designed Questionnaire” for the studies. The minimum age of the participants was 18 years. Of the 20 studies, 15 were from a single country, 3 were from 3 countries, and 2 of them were from more than 3 countries across 4 continents.

The Prevalence of Voiding, Storage, and Post-Micturition Symptoms
The prevalence of voiding and storage symptoms is given in Table 3. Twelve studies mentioned the prevalence of voiding, storage, and post-micturition symptoms. The prevalence of storage symptoms was 23.6%-79%, voiding symptoms was 1.8%-51%, and post-micturition symptoms was 0.3%-46%.

The Prevalence of Combined Voiding, Storage, and Post-Micturition Symptoms
The prevalence of combined voiding, storage, and post-micturition symptoms are given in Table 4. Only 7 studies mentioned combined voiding and storage symptoms. The prevalence of voiding and storage symptoms was 8.3%-26.6% and the combined voiding, storage, and post-micturition symptoms were 6.6%-19.2%.

The Prevalence of Urinary Incontinence
Urinary incontinence is reviewed in Table 5. Fifteen studies mentioned UI with variations in definition. The prevalence of any incontinence was 5.8%-45.8%. The majority of patients suffered from stress urinary incontinence (SUI) with 1.9%-31.8%. The prevalence of urgency urinary incontinence (UUI) and mixed-type urinary incontinence (MUI) was 0.7%-24.4% and 2.1%-12%, respectively.

Main Points
- Lower urinary tract symptoms (LUTS) are quite common in women.
- The definition of LUTS, the selection and exclusion criteria of patients, and heterogeneity are the most common difficulties for evaluating the real impact of LUTS.
- Further studies evaluating LUTS in women are needed, especially in developing and least-developed countries.
Risk Factors for Lower Urinary Tract Symptoms
Risk factors for LUTS in women are shown in Table 6. Increased age was found to be a definitive risk factor for LUTS. Marital and work status, comorbidities, alcohol consumption, body mass index (BMI), smoking status, neurological disease, educational status, higher parity, vaginal delivery, instrumental delivery, prolonged labor, laceration, post-menopausal status, and physical activity were also studied risk factors for LUTS.

The Most Bothersome Symptoms and Healthcare-Seeking Behaviors
The most bothersome or reported symptoms and healthcare-seeking behaviors are shown in Table 7. The coping methods used for bladder symptoms and the reasons for not seeking help were the symptoms were also summarized.

Discussion
We designed a systematic review of epidemiology and population studies in women with LUTS. Mostly, the authors used the ICS definitions to evaluate LUTS. We found 20 eligible studies from the data of 20 countries across 4 continents. In this review, we found that 11.8%-88.5% of women experienced LUTS. The most common symptoms of LUTS were storage symptoms, with 23.6%-79% of women in 12 studies.

In this review, 15 of 20 selected articles were evaluated for UI. Any incontinence was observed in 5.8%-45.8% of women. The most common type of incontinence was SUI with 1.9%-31.8%. Similar to our review, a recent population-based study that investigated the prevalence of incontinence showed that the prevalence of any incontinence was 26.4% in women, but MUI was the most prevalent with 12.6%, followed by SUI and UUI. In a recent systematic review, the prevalence of UI was found to be 25.7%, with SUI being 12.6%, UUI being 5.3%, and MUI being 9.1%. Analysis of a health screening project which evaluated the incidence and remission of UI in women showed that baseline prevalence of UI was 32%, and after 6.5 years, it had increased to 43%. The annual incidence of UI was found to be 3.6%, which increased with age. Heidler et al also...
assessed LUTS in women and showed that the prevalence of LUTS increased from 35.9% to 47.1% in 6.5 years and that the annual incidence of LUTS was 5.3%.

Age was found to be the most common risk factor for LUTS. In this review, we showed that the likelihood of experiencing LUTS increases with age. In contrast to our review, van Breda HM et al.30 showed that the prevalence of LUTS was 94.3%, even in healthy nulligravida women of 18-30 years old. Urinary incontinence may occur even in the early years of life; 41% of female athletes (median age of 22) experienced at least 1 SUI. Nearly 25% of women under 40 also experienced UI during physical activities.31 In line with our results, Abufaraj et al.32 showed that higher age was associated with a higher prevalence of any UI. The 5-year incidence of LUTS was found to be 13.9% in women. The authors showed that the incidence of LUTS increased with age.33 Alcohol consumption was the main changeable risk factor for LUTS, while physical activity was solely not a risk factor for LUTS. A study that summarized the literature on LUTS in women (mainly focused on incontinence and overactive bladder) showed that age, smoking, pregnancy, asthma, obesity, dementia, vaginal delivery, constipation, diuretics, and drugs were risk factors for UI.34 Parity, fetal birth weight, and episiotomy were also found to be risk factors for women with LUTS.35 In a study from Turkey, recurrent urinary tract infection, chronic illness, chronic constipation, and higher BMI were found to be the most common risk factors for women with LUTS.36 Urinary symptoms were also found to be more common in women with pelvic organ prolapse.37 Ethnicity was also another factor for UI. A cross-sectional survey of American Indian women from 1 tribe showed that the study group had similar rates of mixed incontinence, but stress and urge incontinence rates were lower than previous reports.38

All symptoms of LUT were found to be bothersome, but the most visiting issue for women with LUTS was IPSS severity. Loss of bladder control had a higher impact on QoL. Limited fluid intake and wearing absorbent products are the most common coping methods for living with LUTS. Being seen as part of aging and embarrassment from the symptoms are the most common reasons for unwillingness to seek healthcare for the loss of bladder control. Losada et al.31 showed that over 88% of women experienced a negative impact on their concentration, physical activity and confidence, as well as an inability to finish their work, due to their urinary symptoms. Sumarsono et al.39 also found that mental and physical QoL were lower in women with UI compared to women without UI. They mentioned that patients with UI had higher anxiety and depression scores. 43.9% of women with UI visited healthcare professionals for their urinary symptoms. A study by Waetjen et al.40 found that more frequent, more bothersome, and worsening urinary symptoms with a longer symptom

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### Table 1. Quality Assessment for Prevalence Studies Included

| Author          | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Summary |
|-----------------|----|----|----|----|----|----|----|----|----|-----|---------|
| Boyle et al.7   | L  | L  | L  | H  | L  | L  | L  | L  | H  | L   | L       |
| Chapple et al.8 | L  | L  | L  | L  | L  | L  | L  | L  | H  | L   | L       |
| Coyne et al.4   | L  | L  | L  | H  | L  | L  | L  | L  | H  | H   | L       |
| Herschorn et al.9 | L  | L  | L  | H  | L  | L  | L  | L  | H  | L   | L       |
| Irwin et al.10  | L  | L  | L  | H  | L  | L  | L  | L  | H  | L   | L       |
| Kogan et al.11  | L  | L  | H  | H  | L  | L  | L  | L  | H  | H   | L       |
| Kupelian et al.12 | L  | L  | L  | H  | L  | L  | L  | L  | H  | L   | L       |
| Lee et al.13    | L  | L  | L  | H  | L  | L  | L  | L  | H  | L   | L       |
| Liao et al.14   | L  | L  | H  | L  | L  | L  | L  | L  | L  | L   | L       |
| Liu et al.15    | L  | L  | L  | H  | L  | L  | L  | L  | L  | L   | L       |
| Moller et al.16  | L  | L  | L  | L  | L  | H  | L  | L  | L  | L   | L       |
| Moreira et al.17 | L  | L  | L  | L  | L  | L  | L  | L  | H  | L   | L       |
| Mourad et al.18  | L  | L  | L  | H  | L  | L  | L  | L  | H  | L   | L       |
| Osuga et al.19  | L  | L  | H  | L  | L  | L  | H  | L  | L  | L   | L       |
| Plata et al.20   | L  | L  | H  | L  | L  | L  | L  | L  | h  | L   | L       |
| Przydacz et al.21 | L  | L  | L  | L  | L  | L  | L  | L  | L  | L   | L       |
| Soler et al.22   | L  | L  | L  | H  | L  | L  | L  | L  | L  | L   | L       |
| Wang et al.23    | L  | L  | L  | L  | L  | L  | L  | L  | H  | L   | L       |
| Zhang et al.24   | L  | L  | L  | L  | L  | L  | L  | L  | L  | L   | L       |
| Zumrutbas et al.25 | L  | L  | L  | H  | L  | L  | L  | L  | H  | L   | L       |

L, low risk; M, moderate risk; H, high risk.
| Author          | Year | Study Method                             | Number of Women participants | Number of any LUTS | Prevalence (%) | Age | Validated Questionnaire | Definition of LUTS                  | Country                      |
|-----------------|------|------------------------------------------|------------------------------|-------------------|---------------|-----|------------------------|------------------------------------|------------------------------|
| Boyle et al    | 2003 | A population-based, cross-sectional survey | 3760                         | 709               | 18.8          | 40-79 | IPSS                  | Moderate to severe LUTS (IPSS >7) | Netherlands, France, UK Korea |
| Chapple et al  | 2017 | Cross-sectional, population-representative, Internet-based | 4209                         | 2511              | 59.7          | ≥40  | IPSS and PPBC          | ICS definitions                  | China, Taiwan and South Korea |
| Coyne et al    | 2009 | Cross-sectional, population-representative survey | 15 861                       | 12102             | 76.3          | ≥40  | SF-12, PPBC, HADS, IPSS, OAB-q SF | ICS definitions                  | USA, the UK and Sweden         |
| Herschorn et al| 2007 | Population-based telephone cross-sectional survey | 509                          | 294-212           | 56.8          | ≥18  | CATI                  | ICS definitions                  | Canada                        |
| Irwin et al    | 2006 | Population-based, cross-sectional telephone survey | 12 093                       | 8054              | 66.6          | ≥18  | CATI Questionnaire, IPSS | ICS definitions                  | Sweden, Germany, Italy, Canada, and the United Kingdom |
| Kogan et al    | 2014 | Population-based, cross-sectional survey  | 1614                         | 1356              | 84            | ≥18  | CATI                  | ICS definitions                  | Russia, Czech Republic, and Turkey |
| Kupelian et al | 2006 | Population-based, random sample, epidemiologic survey | 3205                         | 596               | 18.6          | 30-79 | AUA-SI, SF-12         | AUA-SI score of 8 or above       | United States                  |
| Lee et al      | 2011 | Population-based, cross-sectional telephone survey | 1112                         | 767               | 68.9          | ≥18  | CATI Questionnaire, IPSS | ICS definitions                  | Korea                         |
| Liao et al     | 2009 | Cross-sectional, questionnaire survey.    | 907                          | 590               | 65            | 21-59 | TNBS, SF-36           | ICS definitions                  | Taiwan                        |
| Liu et al      | 2019 | Internet-based, self-administered survey  | 1063                         | 604               | 56.8          | ≥40  | IPPS, OAB             | ICS definitions                  | Taiwan                        |
| Møller et al   | 2000 | Mail-based questionnaire                  | 2854                         | 794               | 27.8          | ≥40  | BF-LUTS and Designed Questionnaire | ICS definitions                  | Denmark                      |

(Continued)
| Author         | Year | Study Method                          | Number of Women participants | Number of any LUTS | Prevalence (%) | Age | Validated Questionnaire                  | Definition of LUTS | Country   |
|----------------|------|---------------------------------------|------------------------------|--------------------|----------------|-----|------------------------------------------|-------------------|-----------|
| Moreira et al  | 2013 | Cross-sectional, population-based survey | 1500                         | 1262               | 84.1           | ≥30 | OAB-V8 and PPBC item                    | ICS definitions   | Brazil    |
| Mourad et al   | 2018 | Population-based, cross-sectional survey | 1853                         | 1631               | 88             | ≥18 | Designed Questionnaire                  | ICS definitions   | Egypt     |
| Osuga et al    | 2013 | Cross-sectional analyses               | 1218                         | 144                | 11.8           | ≥40 | IPSS and ICIQ-SF                        | IPSS ≥8           | Japan     |
| Plata et al    | 2018 | Cross-sectional, population-based      | 530                          | 493                | 88.5           | ≥18 | Designed Questionnaire                  | IUGA/ICS definitions | Colombia |
| Przydacz et al | 2020 | Population-based, cross-sectional analysis | 3393                       | 2465-1817         | 72.6           | ≥40 | CATI Questionnaire, IPSS, OAB-V8        | ICS Definitions   | Poland    |
| Soler et al    | 2017 | Computer-assisted telephone survey     | 2751                         | 2262-1624         | 82.2           | ≥40 | IPSS and OAB-V8                        | ICS Definitions   | Brazil    |
| Wang et al     | 2015 | Population-based, cross-sectional survey | 1472                        | 900                | 61.1           | ≥18 | ICIQ-FLUTS LF                           | ICS definitions   | China     |
| Zhang et al    | 2015 | Population-based, cross-sectional survey | 18 992                      | 10540              | 55.5           | ≥20 | BF-LUTS and ICIQ-FLUTS                  | ICS definitions   | China     |
| Zumrutbas et al| 2014 | Cross-sectional, population-based survey | 919                         | 672                | 73.5           | ≥18 | Designed Questionnaire, ICIQ-SF         | ICS definitions   | Turkey    |

LUTS, lower urinary tract symptoms; BF-LUTS, Bristol Female Lower Urinary Tract Symptoms questionnaire; ICIQ-FLUTS, Incontinence Questionnaire Female Lower Urinary Tract Symptoms; OAB-V8, Overactive Bladder-Validated 8; PPBC, the patient perception of bladder condition; IPSS, The International Prostate Symptom Score; ICIQ-FLUTS LF, International Consultation on Incontinence Questionnaire Female Lower Urinary Tract Symptoms Long Form; ICIQ-OAB, Incontinence Questionnaire Overactive Bladder; CATI, Computer-assisted Telephone Interview; SF-12, Short Form Survey 12; HADS, Hospital Anxiety and Depression Scale; OAB-q SF, Overactive Bladder Questionnaire Short Form; AUA-SI, American Urological Association Symptom Index; TNBS, Taiwan Nurse Bladder Survey.
duration were the most common factors for seeking treatment in women with UI. Long-term voluntary drug-taking and talking to other individuals about incontinence were also other predictive factors of help-seeking.40

Although sexual dysfunction was not a topic for this review, UI has a significant impact on sexual function. Lim et al41 showed that patients with SUI and their partners had problems with sexual functioning. They also showed that patients with SUI had a lower QoL score compared to patients without SUI. Salonia et al42 found that 46% of women with UI and LUTS had female sexual dysfunction (FSD). The most common findings in FSD were hypoactive sexual desire, arousal disorder, orgasmic deficiency, and dyspareunia or genital pain.42

The main limitation of this study is that it is not a meta-analysis. Our inability to perform meta-analysis and heterogeneity was the most significant issue in producing a robust result. The inclusion of patients from different geographies and different age groups, the evaluation of the entire population including men and women, and most importantly, the lack of use of a standardized definition for LUTS were observed as the main causes of heterogeneity. We did not mainly focus on UI so we did not include studies that evaluated types of UI with specific questionnaires like medical, epidemiologic, and social aspects of aging. The evaluation of only 20 countries may mean that adequate representation is lacking in the results, and the prevalence of LUTS in developing and undeveloped countries is still unknown.

**Conclusion**

The prevalence of LUTS in women is increasing, especially with age. Several factors are affecting the prevalence of LUTS, including the fact that only a small proportion of individuals with LUTS seek healthcare. Therefore, prevention and providing necessary treatments are important for women's health. Since the worldwide prevalence of LUTS remains unknown, multi-continental studies, especially in the developing world, with less heterogeneity and more standardized definitions, are needed to better evaluate real-world data in women with LUTS.

### Table 3. The Prevalence of Voiding and Storage Symptoms

| Author          | Number of Participants with SS | SS Prevalence (%) | Number of Participants with VS | VS Prevalence (%) | Number of Participants with PM | PM Prevalence (%) |
|-----------------|--------------------------------|------------------|-------------------------------|------------------|--------------------------------|------------------|
| Chapple et al4  | 1003                           | 23.8             | 77                            | 1.8              | 67                             | 1.6              |
| Irwin et al10   | 7130                           | 59.2             | 2443                          | 19.5             | 1695                           | 14.2             |
| Kogan et al11   | 1227                           | 76               | 598                           | 37               | 372                            | 23               |
| Lee et al13     | 717                            | 64.4             | 289                           | 25.9             | 155                            | 13.9             |
| Liu et al15     | 251                            | 23.6             | 25                            | 2.3              | 27                             | 2.5              |
| Moreira et al17 | 1146                           | 76.4             | 505                           | 33.7             | 192                            | 12.8             |
| Mourad et al18**| 1464                           | 79               | 946                           | 51               | 853                            | 46               |
| Przydacz et al21| 1334                           | 39.3             | 102                           | 3                | 21                             | 0.6              |
| Soler et al22   | 1002                           | 36.4             | 122                           | 4.4              | 9                              | 0.3              |
| Wang et al23**  | 891                            | 60.5             | 130                           | 8.8              | 93                             | 6.3              |
| Zhang et al24   | 10 245                         | 53.9             | 2444                          | 12.8             | -                              | -                |
| Zumrutbas et al25| 586                            | 64.1             | 341                           | 37.8             | 262                            | 28.7             |

SS, storage symptoms; VS, voiding symptoms; PM, post-micturition symptoms.

**Definitions based on any symptom with nocturia >1.**

### Table 4. The prevalence of combined voiding, store and post-micturition symptoms

| Author          | Number V + S | Prevalence of V + S (%) | Number V + PM | Prevalence of V + PM (%) | Number S + PM | Prevalence of S + PM (%) | Number V + S + PM | Prevalence of V + S + PM (%) |
|-----------------|--------------|-------------------------|---------------|--------------------------|---------------|--------------------------|------------------|--------------------------------|
| Chapple et al4  | 393          | 9.3                     | 42            | 1                        | 121           | 2.9                      | 808              | 19.2                          |
| Irwin et al10   | 1855         | 14.9                    | 931           | 7.7                      | 1348          | 11.3                     | 797              | 6.6                           |
| Lee et al13     | 251          | 22.5                    | -             | -                        | -             | -                        | -                | -                             |
| Liu et al15     | 89           | 8.3                     | 20            | 1.8                      | 42            | 3.9                      | 154              | 14.4                          |
| Przydacz et al21| 492          | 14.5                    | 19            | 0.5                      | 109           | 3.2                      | 391              | 11.5                          |
| Moreira et al17 | 399          | 26.6                    | 117           | 7.8                      | 167           | 11.1                     | 96               | 6.7                           |
| Soler et al22   | 518          | 18.8                    | 18            | 0.6                      | 141           | 5.1                      | 457              | 16.6                          |

V, voiding symptom; S, storage symptoms; PM, post-micturition symptoms.
### Table 5. The Prevalence of Urinary Incontinence Based on Several Definitions

| Author            | Definitions of UI                                                                 | Incontinence (N) | Prevalence Incontinence (%) | SUI (n) | Prevalence SUI (%) | UUI (n) | Prevalence UUI (%) | MUI (n) | Prevalence MUI (%) | Other UI (n) | Other UI (%) |
|-------------------|-----------------------------------------------------------------------------------|------------------|-----------------------------|---------|-------------------|---------|-------------------|---------|-------------------|--------------|-------------|
| Coyne et al⁴       | Any incontinence, previous 4 weeks                                                 | -                | -                           | 5004    | 31.8              | 3869    | 24.4              | -       | -                | 1833         | 9.8         |
| Herschorn et al⁷   | Any incontinence                                                                  | -                | -                           | 132     | 25.5              | 48      | 9.3               | -       | -                |             |             |
| Irwin et al¹⁰      | Any incontinence                                                                  | 1675             | 13.1                        | 721     | 6.4               | 208     | 1.5               | 317     | 2.4              | 329          | 2.8         |
| Kogan et al¹¹      | Any incontinence                                                                  | 363              | 28.4                        | 230     | 20.7              | 40      | 3.6               | 46      | 4.1              | -            | -           |
| Lee et al¹³        | Any incontinence                                                                  | 316              | 28.4                        | 230     | 20.7              | 40      | 3.6               | 46      | 4.1              | -            | -           |
| Liao et al¹⁴       | During past 12 months, any incontinence                                           | 83               | 9.1                         | 26      | 2.8               | 15      | 1.6               | 42      | 4.6              | -            | -           |
| Moreira et al¹⁵    | Any incontinence                                                                  | 87               | 5.8                         | 27      | 1.9               | 11      | 0.7               | 47      | 3.1              | -            | -           |
| Mourad et al¹⁸     | Any incontinence                                                                  | 501              | 27                          | 112     | 6                 | 6       | 224               | 12      | 56               | 3            | -           |
| Osuga et al¹⁹      | Voluntary loss of urine at least twice or more a week.                            | 80               | 6.6                         | 66      | 5.4               | 40      | 3.3               | 26      | 2.1              | -            | -           |
| Plata et al²⁰      | Past 4 weeks, any incontinence                                                    | 255              | 45.8                        | 76      | 13.7              | 120     | 21.5              | 59      | 10.6             | -            | -           |
| Przydacz et al²¹   | Any incontinence                                                                  | 1242             | 36.6                        | 415     | 12.2              | 316     | 9.3               | 348     | 10.3             | 163          | 4.8         |
| Soler et al²²      | Symptoms occurring less than half the time or more                                | 1255             | 45.6                        | 562     | 20.4              | 409     | 14.9              | -       | -                | 411          | 15.3        |
| Wang et al²³       | Past 4 weeks, any incontinence                                                    | 562              | 38.1                        | 265     | 18.0              | 57      | 3.8               | 47      | 3.2              | 193          | 13.1        |
| Zhang et al²⁴      | Past 4 weeks, any incontinence                                                    | 6052             | 31.9                        | 3592    | 18.9              | 488     | 2.6               | 1789    | 9.4              | -            | -           |
| Zumrutbas et al²⁵  | Any incontinence                                                                  | 354              | 38.7                        | 194     | 21.2              | 75      | 8.2               | 82      | 9                | 24           | 2.6         |

SUI, stress urinary incontinence; UUI, urgency urinary incontinence; MUI, mixed urinary incontinence; other UI, any other urinary incontinence (leak for no reasons, nocturnal enuresis, leak during sexual activity). n, number of patients.
**Table 6. Risk Factors for Lower Urinary Tract Symptoms (LUTS) in Women**

| Risk factors for LUTS                                      | Not a risk factor for LUTS                      |
|-----------------------------------------------------------|------------------------------------------------|
| Age*7,12,15,17,19,23,25                                   | Smoking status7,15                             |
| Martial and work status8                                  | Educational status8                            |
| Comorbidities*8,12,15,23,24                               | Higher BMI15                                   |
| Alcohol consumption23,24                                  | Neurological disease15                         |
| Higher BMI23,24                                           | Physical activity7                             |
| Smoking status23,24                                        |                                               |
| Neurological disease8                                      |                                               |
| Educational status23                                       |                                               |
| Higher parity, vaginal delivery23,24                       |                                               |
| Instrumental delivery, prolonged labor, laceration, and post-menopausal status23,24 |                                               |
| *Comorbidities: diabetes mellitus, heart disease, hypertension, and hyperlipidemia. LUTS, lower urinary tract symptoms; BMI, body mass index.

**Table 7. The Most Bothersome Symptoms and Healthcare-Seeking Behaviors**

| The most bothersome or reported symptoms for LUTS:4,8,10,11,13,15,17,21,24 | Storage symptoms |
|-----------------------------------------------------------------------------|------------------|
|                                                                             | Nocturia          |
|                                                                             | Frequency         |
|                                                                             | Urgency           |
|                                                                             | Stress urinary incontinence |
|                                                                             | Urge urinary incontinence |
|                                                                             | Mixed urinary incontinence |
|                                                                             | Voiding, storage, and post-micturition symptoms |
|                                                                             | Leaking for no reason |
|                                                                             | Nocturnal enuresis |
|                                                                             | Post-micturition dribble |
| The most visiting issue for women with LUTS:5                              | IPSS severity     |
| The symptoms with greater impact on patients’ QoL:11                        | Loss of bladder control|
|                                                                             | Overall bladder symptoms |
| The coping methods used for bladder symptoms:11,18,19                       | Limiting fluid intake |
|                                                                             | Using wearable products |
|                                                                             | Herbal therapies  |
|                                                                             | Drugs             |
| The reasons for not seeking help were:11                                    | The symptoms not being severe enough |
|                                                                             | The symptoms being attributed to the natural consequence of aging |
|                                                                             | The symptoms were viewed as shameful |
|                                                                             | The patient could self-treat their symptoms. |

LUTS, lower urinary tract symptoms; QoL, quality of life; IPSS, The International Prostate Symptom Score.

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