

## REVIEW ARTICLE

# Prevalence of urinary incontinence among women in Turkey: A systematic review and meta-analysis

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## Abstract

Urinary incontinence (UI), defined as the involuntary leakage of urine, is a common condition that affects women's quality of life and overall health. UI becomes more frequent with age and is also observed during pregnancy and postpartum. This systematic review and meta-analysis aimed to determine the prevalence of UI among women. A literature search was conducted between December 2024 and February 2025 in Google Scholar, PubMed, Web of Science, Türkiye Citation Index, Ulakbim, and Turkish Medline. Risk of bias was assessed using the Joanna Briggs Institute checklist. Forty-five studies published between 2005 and 2025, including 41,038 participants, were analyzed. The pooled prevalence of UI among women aged 15 years and older was 36.7%. Prevalence estimates for stress, urgency, and mixed UI were 31.1%, 18.4%, and 27.5%. Definitions used influenced prevalence rates. Planning and delivering appropriate health services based on these findings can contribute to protecting and improving women's health. In Türkiye, it would be beneficial to develop a policy to raise awareness about urinary incontinence in women and to evaluate the condition. Interventions can be implemented nationwide in this way. (*Afr J Reprod Health* 2026; 30 [19]: 127-142).

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**Keywords:** women, prevalence, urinary incontinence, urinary incontinence in women

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## Résumé

L'incontinence urinaire (IU), définie comme une perte involontaire d'urine, est un problème courant qui affecte la qualité de vie et l'état de santé général des femmes. L'IU devient plus fréquente avec l'âge, mais elle est également observée pendant la grossesse et la période post-partum. L'amélioration des connaissances des femmes concernant l'IU peut contribuer à réduire sa prévalence. Cette revue systématique et méta-analyse visait à déterminer la prévalence de l'IU chez les femmes. Une recherche documentaire a été menée entre décembre 2024 et février 2025 dans Google Scholar, PubMed, Web of Science, Türkiye Citation Index, Ulakbim et Turkish Medline. Le risque de biais a été évalué à l'aide de la liste de contrôle de l'Institut Joanna Briggs. Quarante-cinq études publiées entre 2005 et 2025, incluant 41 038 participantes, ont été analysées. La prévalence globale de l'IU chez les femmes de 15 ans et plus était de 36,7 %. Les taux pour l'IU d'effort, par urgenturie et mixte étaient de 31,1 %, 18,4 % et 27,5 %. Les définitions employées influençaient les estimations. La planification et la prestation de services de santé appropriés, fondées sur ces résultats, peuvent contribuer à protéger et à améliorer la santé des femmes. En Turquie, il serait bénéfique d'élaborer une politique visant à sensibiliser la population à l'incontinence urinaire chez les femmes et à évaluer cette pathologie. Des interventions peuvent ainsi être mises en œuvre à l'échelle nationale. (*Afr J Reprod Health* 2026; 30 [19]: 127-142).

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**Mots-clés:** femmes, prévalence, incontinence urinaire, incontinence urinaire chez les femmes

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## Introduction

Urinary incontinence (UI) is defined by the International Continence Society (ICS) as the involuntary leakage of urine that causes social and hygienic problems and can be objectively demonstrated.<sup>1</sup> The most common types are stress urinary incontinence (SUI), urge urinary

incontinence (UUI) and mixed urinary incontinence (MUI).<sup>2</sup> Urinary incontinence during exertion such as coughing, sneezing or exercise is called SUI, urinary incontinence when feeling the urge to urinate and trying to reach the toilet is called UUI, and urinary urgency and urinary incontinence with coughing, sneezing or exertion is called MUI.<sup>3</sup> Urinary incontinence is a complex and

multifactorial problem that can arise for many reasons<sup>4</sup> The key risk factors for urinary incontinence are listed as age, gender, ethnicity, race, menopause, smoking, history of chronic constipation, obesity, pregnancy, childbirth, and gynaecological surgery.<sup>5</sup> Urinary incontinence is a significant problem that negatively affects the physical, psychological, social and economic well-being of individuals and families. It also has negative effects on sexual relations, sleep and quality of life.<sup>6</sup> Despite all the problems caused by UI, most women around the world do not seek medical help because they believe urinary incontinence is a natural consequence of childbirth or ageing.<sup>7,8</sup>

The reasons why women do not seek medical care include embarrassment, fear, communication difficulties in healthcare services, lack of awareness, neglect and cost.<sup>9</sup> These reasons, which result in women not seeking healthcare, further emphasise the importance of screening programmes aimed at identifying UIs.<sup>10</sup> Preventing and resolving incontinence issues requires multidisciplinary teamwork. Therefore, healthcare professionals bear significant responsibilities in identifying, assessing, and monitoring UI within the community and in protecting against UI.<sup>2,11</sup> It is reported that over 200 million people worldwide experience urinary incontinence, which is two to five times more common in women than in men.<sup>12</sup> In Portugal, 9.9% of women<sup>13</sup>, in Saudi Arabia, 44.2% of women<sup>14</sup>, in Jordan, 64.1% of women<sup>15</sup>, 16% of women in China<sup>16</sup>, and 41.8% of women in Turkey have been found to have UI prevalence.<sup>17,18</sup>

These differences are attributed to the varying definitions of urinary incontinence, differences between societies, studies being conducted in different populations, and differences in data collection methods. It is difficult to determine the true prevalence of urinary incontinence in women. Therefore, a systematic review and meta-analysis was considered necessary. Meta-analysis is the best method for analysing the contradictions between studies and the possible reasons for the differences.<sup>19</sup> Although there are prevalence and literature synthesis studies on this subject in Turkey, no meta-analysis studies have been found. Therefore, a systematic review

and meta-analysis were conducted. It is expected that the data obtained at the national level will contribute to current and future scientific research on the subject.

### ***Objective and research questions***

The aim of this study is to determine the prevalence of UI in women in Turkey.

The research questions are: (1) What is the prevalence of UI in women in Turkey? (2) Does the prevalence of UI differ according to the year of the study, diagnostic tests, and geographical regions?

### ***Methods***

This systematic review was prepared based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline.<sup>20</sup>

### ***Screening strategy and selection criteria***

The articles included in this systematic review were searched in Google Scholar (<http://scholar.google.com.tr>), PubMed, Web of Science, Türkiye Atıf Dizini, Ulakbim, and Türk Medline databases between 8 December 2025 and 15 December 2025. Both Turkish and English keywords were used in the search. International databases were searched using the keyword combinations "urinary incontinence and Turkey", while national databases were searched using the keyword combinations "urinary incontinence", "urinary incontinence in women", and "prevalence of urinary incontinence". The terms used in the PubMed search were (("urinary incontinence" [MeSH Terms]) AND "prevalence" [MeSH Terms]) AND "women" [MeSH Terms]) AND "Turkey" [MeSH Terms]).

PICOS is as follows:

Population: Women aged 15 years and older

Intervention: None

Comparison: None

Outcome: Prevalence of urinary incontinence

Study designs: Descriptive, cross-sectional, (descriptive and cross-sectional) studies

### ***Inclusion and exclusion criteria***

Inclusion criteria for systematic review included (1) descriptive, cross-sectional, and

(descriptive and cross-sectional) studies reporting the prevalence of urinary incontinence in women in Turkey (2) studies conducted with women aged 15 years and older (3) studies published in national/international journals between January 2005 and January 2025, in English or Turkish. The exclusion criteria included (1) studies targeting specific populations (children, adolescents, the elderly, those with chronic diseases, pregnant women, postpartum women, those in menopause, etc.), (2) studies conducted jointly with men and/or women, (3) abstracts, case reports, review articles, cohort, case-control, experimental studies, and studies whose full text was unavailable, and (4) studies with missing data.

The search yielded 14,400 records. Studies that did not meet the study objectives and duplicate studies were excluded based on an examination of the titles and abstracts. The full texts of the remaining 151 studies were reviewed, and a total of 45 studies that met the inclusion criteria were evaluated. The selection process is shown in Figure 1.

### **Data extraction and quality assessment**

In this systematic review, a data extraction form was developed by the researchers. The data extraction form includes data on the authors, year, design, city/region where the studies were conducted, measurement tools, sample size, age range, and UI prevalence of the studies reviewed. The methodological quality assessment of the studies included in the systematic review were conducted independently by two researchers (SK and HDT), and any disagreements between the researchers were resolved by consensus. The Joanna Briggs Institute (JBI) critical appraisal tools Meta-Analysis of Statistics Assessment and Review Instrument (MAStARI) were used to assess the quality of the studies. The assessment was performed according to the Analytical Cross-Sectional Studies Checklist. In this checklist, each question was scored 0 or 1, and the total score ranged from 0 to 8.<sup>21</sup> The selected studies were divided into three quality groups based on the score of each study. A total score greater than 80% was defined as high quality, a score between 50% and

80% as medium quality, and a score below 50% as low quality.

### **Statistical analysis**

The data were analysed using Comprehensive Meta Analysis (V 3.3.070, USA). The Q statistic and I<sup>2</sup> values were examined for heterogeneity testing. For publication bias, the funnel plot, Orwin's fail-safe N value, Kendall's tau, Egger's regression analysis, and Orwin's fail-safe N value with the funnel plot were examined. Based on the results of the heterogeneity test, the event rate value was interpreted according to the random effect. The significance level was set at  $p < 0.05$ .

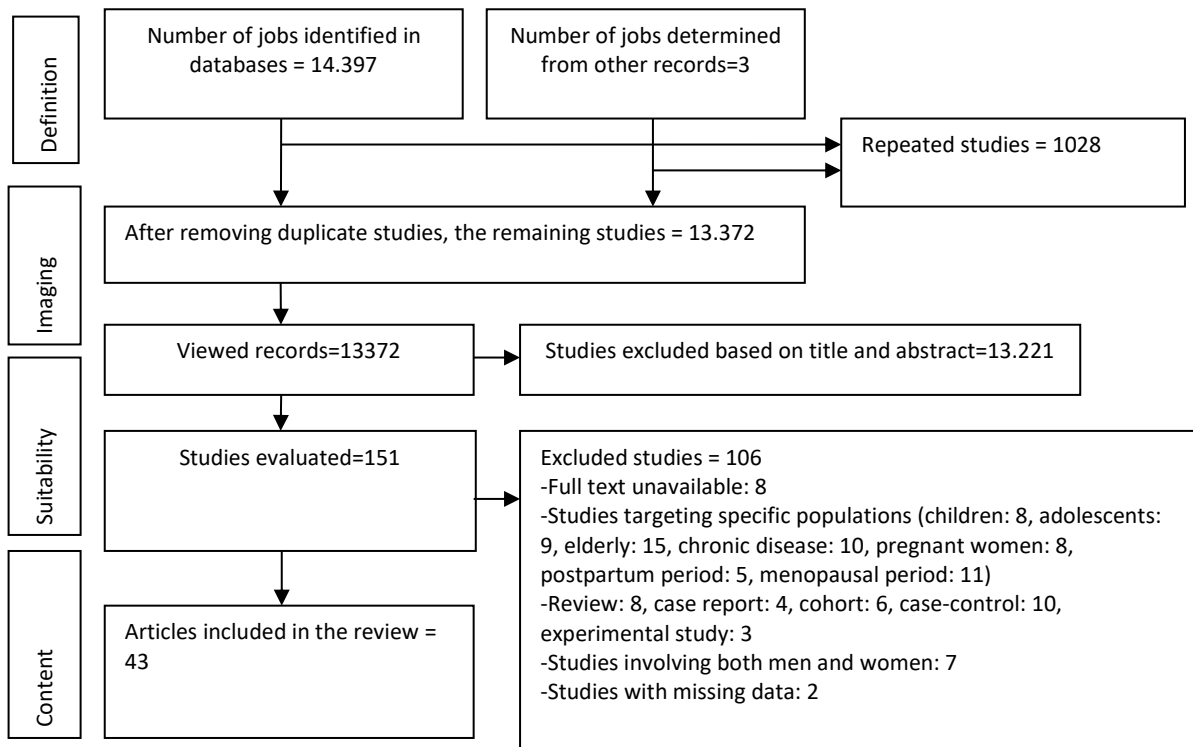
### **Ethical statement**

Systematic reviews and meta-analyses do not require ethics committee approval as they do not involve direct interaction with or intervention in human participants.

## **Results**

### **Characteristics of the studies**

The studies included in this systematic review were published between 2005 and 2024. The studies were conducted in 24 different provinces and seven different regions of Turkey; the highest number of studies were conducted in the Central Anatolia Region (thirteen studies), while the lowest number of studies were conducted in the Black Sea Region (one study). The sample size of the studies ranged from 201 to 6,473. In most studies, participants (health centre: 22), (clinic: 16), (community: 6), (health centre and clinic: 1) formed the sample. Various universal and non-universal measurement tools were used to determine the prevalence of urinary incontinence. Questionnaires developed by the researchers were used in 17 studies, the International Consultation on Incontinence Questionnaire Short Form (ICIQ-SF) in 22 studies, the Urinary Distress Inventory (UDI-6) in 4 studies, and the Bristol Female Lower Urinary Tract Symptom Index (BFLUTS) in 2 studies. Sixteen of the studies defined urinary incontinence as any time of involuntary urine leakage, 2 defined it as urine leakage in the last 3 months, and 26 defined it as

**Table 1:** Distribution of mean FPAS scores among young men based on their knowledge of family planning methods and sexual health- Ankara, Türkiye, 2024**Figure 1:** The selection process for the studies

urine leakage in the last 4 weeks (Table 1). Details of the studies are provided in Table 1.

### **Quality assessment results of the studies**

The quality assessment conducted using the JBI Critical Appraisal Checklist revealed that the number of high, medium, and low-quality studies was 13 (29%), 23 (51%), and 9 (20%), respectively. Nine studies had a low risk of bias, twenty-three had a medium risk, and thirteen had a high risk.

### **Assessment of heterogeneity and publication bias**

Publication bias in the studies included in the research was examined using funnel plots, Orwin's fail-safe N, Kendall's tau, and Egger's regression intercept methods. When examining the standard error distributions corresponding to the logit event rate values in the funnel plot, a few data points are

observed on the right side (positive logit values), but there is a symmetrical lack of data on the left side (negative logit values) with such large deviations. While there are some points in the lower left (negative effects with high standard errors), there is no data of similar density in the lower right. Orwin's fail-safe N value was determined to be 2891. Since the obtained N value is greater than  $5 \times 152 + 10 = 770$ , it indicates that the results are robust. In other words, 2891 studies with unpublished, effective results would be required for the meta-analysis to lose its significant effect. Kendall's tau value was found to be significant at  $-0.149$  ( $p=0.003$ ). Egger's regression constant was found to be insignificant at  $-2.411$  ( $p=0.089$ ). According to Orwin's fail-safe N and Egger's regression intercept methods, no publication bias was detected. However, as publication bias was detected according to Kendall's tau and the funnel plot, Duval and Tweedie's trim and fill method was used, but no correction was obtained for the random

**Table 1:** Characteristics of studies included in the systematic review-1

| Authors and Year                     | Study Design                    | Study Population | City/Region                           | Number | Age/Year                    | Measuring Device  | UI Diagnosis Time                                    | Prevalence                                         |
|--------------------------------------|---------------------------------|------------------|---------------------------------------|--------|-----------------------------|-------------------|------------------------------------------------------|----------------------------------------------------|
| Koçak et al., 2005 <sup>22</sup>     | Cross-sectional                 | Health centres   | Aydın<br>Aegean Region                | 1012   | 18-92 age<br>43.60 ± 16.47  | ICIQ-SF           | Involuntary urine leakage in the last 4 weeks        | <b>IU: 23.9</b><br>SUI:33.1<br>UI:25.6<br>MUI:41.3 |
| Kök et al., 2006 <sup>23</sup>       | Cross-sectional                 | Clinic           | Ankara<br>Central Anatolia<br>Region  | 229    | 20 age and ↑<br>44.71±12.12 | ICIQ-SF           | Involuntary urine leakage in the last 4 weeks        | <b>IU: 37.1</b><br>SUI:40.0<br>UI:15.2<br>MUI:36.4 |
| Filiz et al., 2006 <sup>24</sup>     | Cross-sectional                 | Health centres   | Sakarya<br>Marmara Region             | 650    | 17-65 age<br>32.2±10.6      | self-administered | Any involuntary urine leakage                        | <b>IU: 16.4</b><br>SUI:20.8<br>UI:17.9<br>MUI:61.3 |
| Çetinel et al., 2007 <sup>25</sup>   | Cross-sectional                 | Clinics          | All Regions                           | 5.565  | 44.71 ± 12.12               | ICIQ-SF           | Involuntary urine leakage in the last 4 weeks        | IU:35.7<br>SUI:39.8<br>UI: 24.8<br>MUI: 28.9       |
| Onur et al., 2009 <sup>26</sup>      | Cross-sectional                 | Health centres   | Elazığ<br>Eastern Anatolia<br>Region  | 1054   | 17-80 age<br>39.45 + 11.29  | UDI-6             | Any involuntary urine leakage                        | IU:46.3<br>SUI:46<br>UI: 43<br>MUI: 36             |
| Çiftçi and Günay, 2011 <sup>27</sup> |                                 | Clinic           | Kayseri<br>Central Anatolia<br>Region | 775    | 18-67 age<br>39.4±8.5       | self-administered | Any involuntary urine leakage                        | IU:36.6<br>SUI:26.8<br>UI: 8.5<br>MUI: 64.7        |
| Özdemir et al., 2011 <sup>28</sup>   | Cross-sectional                 | Health centres   | Ankara<br>Central Anatolia<br>Region  | 610    | 20-80 yaş, 36               | self-administered | Involuntary urine leakage in the last 4 weeks        | <b>IU: 22.6</b><br>SUI:73.9<br>UI:8.7<br>MUI:17.4  |
| Oztora et al., 2011 <sup>29</sup>    | Descriptive and cross-sectional | Health centres   | Edirne<br>Marmara Region              | 901    | 20-87 age<br>42.77±15.06    | ICIQ-SF           | Involuntary urinary incontinence in the last 4 weeks | <b>IU: 25.2</b><br>SUI:11.2<br>UI:4.8<br>MUI:6.4   |

**Table 1:** Characteristics of studies included in the systematic review-2

| Authors and Year                   | Study Design                    | Study Population        | City/Region                              | Number | Age/Year                    | Measuring Device             | UI Diagnosis Time                                    | Prevalence                                         |
|------------------------------------|---------------------------------|-------------------------|------------------------------------------|--------|-----------------------------|------------------------------|------------------------------------------------------|----------------------------------------------------|
| Koç et al., 2011 <sup>30</sup>     | Descriptive and cross-sectional | Health centres          | Malatya Eastern Anatolia Region          | 800    | 20-93 age<br>38.70 ± 15.15  | References to other articles | Involuntary urinary incontinence in the last 4 weeks | <b>IU: 32.4</b><br>SUI:17.8<br>UI:9.7<br>MUI:72.6  |
| Işıklı et al., 2011 <sup>31</sup>  |                                 | Community               | Eskişehir Central Anatolia Region        | 1023   | 18 age and ↑                | UDI-6                        | Any involuntary leakage of urine                     | <b>IU: 31.4</b><br>SUI:28.7<br>UI:6.2<br>MUI:49.5  |
| Can et al., 2012 <sup>32</sup>     | Descriptive                     | Clinic                  | Denizli Aegean Region                    | 260    | 15-49 age<br>33.02±9.32     | self-administered            | Any involuntary leakage of urine                     | <b>IU: 61.5</b><br>SUI:38.8<br>UI:23.1<br>MUI:29.1 |
| Demirci et al., 2012 <sup>33</sup> | Descriptive                     | Health centres          | Uşak Aegean Region                       | 259    | 18 age and ↑ 35.69 ± 9,99   | self-administered            | Any involuntary urine leakage                        | IU:26.6                                            |
| Dursun et al., 2012 <sup>34</sup>  | Cross-sectional                 | Health centres, Clinics | Western and Eastern Regions              | 6.473  | 18-86 age, 36               | ICIQ-SF                      | Involuntary urine leakage in the last 4 weeks        | <b>IU: 20.9</b><br>SUI:10<br>UI:8.3<br>MUI:2.6     |
| Kocaöz et al., 2012 <sup>35</sup>  | Cross-sectional                 | Clinic                  | Ankara Central Anatolia Central Anatolia | 288    | 19-80 age<br>41.35 ± 12.46  | ICIQ-SF                      | Involuntary urinary leakage in the last 4 weeks      | <b>IU: 31.9</b><br>SUI:35.9<br>UI:23.9<br>MUI:23.9 |
| Öztürk et al., 2012 <sup>36</sup>  | Descriptive                     | Health centres          | İstanbul Marmara Region                  | 201    | 35 age and ↑<br>51.07±11.05 | ICIQ-SF                      | Involuntary urinary leakage in the last 4 weeks      | <b>IU: 42.8</b><br>SUI: 29<br>UI:43.0<br>MUI:28    |
| Bektaş et al., 2013 <sup>37</sup>  | Cross-sectional                 | Health centres          | Sivas Central Anatolia Region            | 800    | 15 age and ↑<br>39.83±12.99 | self-administered            |                                                      | SUI:25.1                                           |

**Table 1:** Characteristics of studies included in the systematic review-3

| Authors and Year                     | Study Design    | Study Population | City/Region                            | Number | Age/Year                   | Measuring Device             | UI Diagnosis Time                                    | Prevalence                                          |
|--------------------------------------|-----------------|------------------|----------------------------------------|--------|----------------------------|------------------------------|------------------------------------------------------|-----------------------------------------------------|
| Şensoy et al., 2013 <sup>38</sup>    | Cross-sectional | Clinic           | Afyon<br>Aegean Region                 | 1050   | 20-80 age<br>48.80 ± 11.53 | ICIQ-SF                      | Involuntary urinary incontinence in the last 4 weeks | <b>IU: 44.6</b><br>SUI: 31<br>UUI:47.4<br>MUI:33.1  |
| Terzi et al., 2013 <sup>39</sup>     | Cross-sectional | Clinic           | Kocaeli<br>Marmara Region              | 555    | 18 age and ↑               | UDI-6                        | Any involuntary leakage of urine                     | <b>IU: 44.8</b><br>SUI:17.1<br>UUI:8.3<br>MUI:17.3  |
| Ünsal et al., 2013 <sup>40</sup>     | Cross-sectional | Health centres   | Eskişehir<br>Central Anatolia Region   | 500    | 20-81 age<br>46.97±15.65   | References to other articles | Involuntary urine leakage in the last 4 weeks        | <b>IU: 41.4</b><br>SUI:35.7<br>UUI:15.5<br>MUI:48.8 |
| Sarıcı et al., 2014 <sup>41</sup>    | Cross-sectional | Community        | Ankara<br>Central Anatolia Region      | 1636   | 20-49 age<br>34.4 ± 5.26   | ICIQ-SF                      | Involuntary urine leakage in the last 4 weeks        | <b>IU: 26.9</b><br>SUI:53.2<br>UUI:25.9<br>MUI:20.9 |
| Durukan et al., 2015 <sup>42</sup>   | Cross-sectional | Clinic           | Mersin<br>Mediterranean Region         | 1320   | 18-70 age<br>40.07         | BFLUTS                       | Any involuntary leakage of urine                     | IU:21.3<br>SUI:8.6<br>UUI:5.3<br>MUI:7.4            |
| Gözükara et al., 2015 <sup>43</sup>  | Cross-sectional | Health centres   | Şanlıurfa<br>Southeast Anatolia Region | 300    | 15-49 age<br>31.8 ±7.9     | self-administered            | Involuntary urine leakage in the last 4 weeks        | IU:39.3<br>SUI:15.3<br>UUI: 4.3<br>MUI: 19.7        |
| Özkan and Sapmaz, 2015 <sup>44</sup> | Cross-sectional | Clinic           | Elazığ<br>Doğu Anadolu                 | 462    | 17 age and ↑<br>33.6±8.3   | ICIQ-SF                      | Involuntary urine leakage in the last 4 weeks        | <b>IU: 31.4</b><br>SUI: 57<br>UUI: 34<br>MUI:9      |
| Akkuş and Pınar, 2016 <sup>45</sup>  | Cross-sectional | Clinic           | Ankara<br>Central Anatolia Region      | 150    | 18-80 age<br>48.7 ±14.3    | References to other articles | Involuntary urine leakage in the last three months   | IU:86.7<br>SUI:37.7<br>UUI:3.1<br>MUI:59.2          |

**Table 1:** Characteristics of studies included in the systematic review-4

| Authors and Year                     | Study Design    | Study Population | City/Region                        | Number | Age/Year                         | Measuring Device             | UI Diagnosis Time                                    | Prevalence                                                        |
|--------------------------------------|-----------------|------------------|------------------------------------|--------|----------------------------------|------------------------------|------------------------------------------------------|-------------------------------------------------------------------|
| Cayan et al., 2016 <sup>18</sup>     | Cross-sectional | Community        | All Regions                        | 1217   | 18-80 age<br>38.26 ± 12.70       | ICIQ-SF                      | Involuntary urine leakage in the last four weeks     | <b>IU: 14.6</b><br><b>SUI:32</b><br><b>UI:56</b><br><b>MUI:12</b> |
| Kılıç, 2016 <sup>46</sup>            | Cross-sectional | Health centres   | Erzurum<br>Eastern Anatolia Region | 430    | <b>20 age and ↑</b>              | References to other articles | Any involuntary leakage of urine                     | IU:37.2<br>SUI:33.7<br>UI:20.6<br>MUI:31.8                        |
| İrer et al., 2017 <sup>47</sup>      | Cross-sectional | Community        | İzmir<br>Aegean Region             | 719    | 18-85 age<br>51.2±11.1           | ICIQ - SF                    | Involuntary urinary incontinence in the last 4 weeks | IU:50.3<br>SUI:34.8<br>UI:6.9<br>MUI:8.6                          |
| Özdemir et al., 2018 <sup>48</sup>   | Cross-sectional | Health centres   | Sakarya<br>Marmara Region          | 1161   | 20-49 age<br>36.38 ± 7.39        | References to other articles | Involuntary urine leakage in the last three months   | <b>IU: 71.5</b><br>SUI:5.8<br>UI:33.9<br>MUI:60.4                 |
| Yücel et al., 2018 <sup>49</sup>     | Cross-sectional | Community        | İzmir<br>Aegean Region             | 293    | 20 age and ↑<br>42.86±1.51       | ICIQ-SF                      | Involuntary urine leakage in the last four weeks     | <b>IU: 29.7</b><br>SUI:44.8<br>UI:24.1<br>MUI:31.1                |
| Baykuş and Yenal, 2019 <sup>50</sup> | Descriptive     | Clinic           | İzmir<br>Aegean Region             | 1200   | 18 age and ↑<br>34.68 ± 13.52    | References to other articles | Any involuntary urine leakage                        | IU:26.3                                                           |
| Aynacı, 2020 <sup>51</sup>           | Cross-sectional | Clinic           | Edirne<br>Marmara Region           | 622    | 30-65 age<br>55.24±16.20         | ICIQ-SF                      | Involuntary urine leakage in the last 4 weeks        | <b>IU: 28.2</b><br>SUI:58.5<br>UI:11.9<br>MUI:29.5                |
| Alkurt Narçiçeği, 2021 <sup>52</sup> | Cross-sectional | Health centres   | Elazığ<br>Eastern Anatolia Region  | 268    | <b>40-67 age</b><br><b>47.00</b> | ICIQ - SF                    | Involuntary urine leakage in the last 4 weeks        | IU:17.5                                                           |
| Bektaş et al., 2021 <sup>53</sup>    | Cross-sectional | Clinic           | Ankara<br>Central Anatolia Region  | 1459   | 54.1±6.9                         | ICIQ - SF                    | Involuntary urinary incontinence in the last 4 weeks | IU: 65.66<br>SUI: 49.68<br>UI: 20.77<br>MUI:29.54                 |

**Table 1:** Characteristics of studies included in the systematic review-5

| Authors and Year                                    | Study Design                    | Study Population | City/Region                            | Number | Age/Year                      | Measuring Device  | UI Diagnosis Time                                    | Prevalence                                     |
|-----------------------------------------------------|---------------------------------|------------------|----------------------------------------|--------|-------------------------------|-------------------|------------------------------------------------------|------------------------------------------------|
| Gamsızkan et al., 2021 <sup>54</sup>                | Cross-sectional                 | Health centres   | Düzce<br>Black Sea Region              | 589    | 18 age and ↑<br>47.47±14.09   | UDI-6             | Any involuntary leakage of urine                     | IU:26.7<br>SUI: 44.6<br>UII: 25.5<br>MUI:29.9  |
| Yakıt Ak and Oskay, 2021 <sup>18</sup>              | Descriptive and Cross-sectional | Clinic           | Diyarbakır<br>Eastern Anatolia Region  | 410    | 20 age and ↑                  | BFLUTS            | Any involuntary loss of urine                        | IU:66.9<br>SUI: 48.9<br>UII: 23.0<br>MUI: 28.1 |
| Yıldırım et al., 2021 <sup>11</sup>                 | Descriptive                     | Clinic           | Istanbul<br>Marmara Region             | 212    | 18 age and ↑47.46<br>± 12.83  | ICIQ-SF           | Involuntary urinary incontinence in the last 4 weeks | IU:52.4<br>SUI: 12.3<br>UII: 37.7<br>MUI: 30.2 |
| Şentürk Erenel and Çiçek Özdemir, 2022 <sup>7</sup> | Descriptive and Cross-sectional | Community        | All regions                            | 400    | 18 age and ↑<br>36.89 ± 11.42 | ICIQ-SF           | Urinary incontinence in the last 4 weeks             | IU:39.0<br>SUI: 38.5<br>UII: 27.0<br>MUI:23.7  |
| Aydemir and Esenkaya, 2023 <sup>8</sup>             | Cross-sectional                 | Clinic           | Yozgat<br>Central Anatolia Region      | 300    | 20 age and ↑<br>41.2 ± 13.49  | ICIQ-SF           | Urinary incontinence in the last 4 weeks             | IU:48                                          |
| Bahar et al., 2023 <sup>10</sup>                    | Descriptive                     | Health centres   | Gaziantep<br>Southeast Anatolia Region | 252    | 18 age and ↑<br>37.36±8.60    | ICIQ-SF           | Urinary incontinence in the last 4 weeks             | IU:36.1                                        |
| Çetin Dağlı and Koca, 2023 <sup>3</sup>             | Descriptive, cross-sectional    | Health centres   | Van<br>Eastern Anatolia Region         | 227    | 19 age and ↑<br>36.39 ± 9.90  | self-administered | Any involuntary leakage of urine                     | IU:36.6<br>SUI: 32.6<br>UII: 37.3<br>MUI: 32.6 |
| Akan and Sancar, 2024 <sup>5</sup>                  | Descriptive and cross-sectional | Health centres   | Mersin<br>Mediterranean Region         | 903    | 18 age and ↑                  | self-administered | Any involuntary leakage of urine                     | IU:28.9                                        |
| Dönmez et al., 2024 <sup>6</sup>                    | Descriptive and Cross-sectional | Health centres   | Muğla,<br>Aegean Region                | 417    | 18 age and ↑                  | ICIQ-SF           | Urinary incontinence in the last 4 weeks             | IU:34.8                                        |

**Table 1:** Characteristics of studies included in the systematic review-6

| Authors and Year                            | Study Design    | Study Population | City/Region                                                         | Number | Age/Year                  | Measuring Device             | UI Diagnosis Time                        | Prevalence                                     |
|---------------------------------------------|-----------------|------------------|---------------------------------------------------------------------|--------|---------------------------|------------------------------|------------------------------------------|------------------------------------------------|
| Sezer Yıldız and Ayrancı, 2024 <sup>2</sup> | Cross-sectional | Health centres   | Eskişehir<br>Central Anatolia Region                                | 237    | 18-70 age<br>38.00 ± 13.1 | ICIQ-SF                      | Urinary incontinence in the last 4 weeks | IU:41.8                                        |
| Yağmur and Gül, 2021 <sup>4</sup>           | Cross-sectional | Health centres   | Batman<br>Eastern Anatolia Region                                   | 286    | 40-69 age<br>51.6±8.8     | Reference to another article | Any involuntary leakage of urine         | IU:30.1<br>SUI: 30.2<br>MUI: 31.4              |
| Başer et al., 2021 <sup>55</sup>            | Cross-sectional | Health centres   | Ankara and Sakarya<br>Central Anatolia Region<br>and Marmara Region | 2563   | 44.1±14.3<br>18 age and ↑ | self-administered            | Any involuntary urine leakage            | IU: 42.8<br>SUI: 31.1<br>UUI: 28.7<br>MUI:16.8 |

**Table 2:** Prevalence of urinary incontinence

|     | n  | Meta Analysis       |       |        | Heterogeneity |        |                |
|-----|----|---------------------|-------|--------|---------------|--------|----------------|
|     |    | Event Rate (%95 CI) | Z     | p      | Q-value       | p      | I <sup>2</sup> |
| UI  | 44 | 36.7 (32.5-41.1)    | -5.8  | <0.001 | 3025.866      | <0.001 | 98.6           |
| MUI | 36 | 27.5 (21.9-34.0)    | -6.3  | <0.001 | 4473.697      | <0.001 | 99.2           |
| SUI | 37 | 31.1 (26.0-36.6)    | -6.3  | <0.001 | 3737.201      | <0.001 | 99.0           |
| UUI | 35 | 18.4 (14.8-22.8)    | -11.0 | <0.001 | 3099.051      | <0.001 | 98.9           |

CI: Confidence Interval

**Table 3:** Prevalence of urinary incontinence according to definitions of urinary incontinence (within UI only)

|                                                          | n  | Meta Analysis       |        |        | Heterogeneity |        |                |
|----------------------------------------------------------|----|---------------------|--------|--------|---------------|--------|----------------|
|                                                          |    | Event Rate (%95 CI) | Z      | p      | Q-value       | p      | I <sup>2</sup> |
| Any involuntary loss of urine                            | 16 | 35.4 (29.7-41.5)    | -4.560 | <0.001 | 663.424       | <0.001 | 97.7           |
| One episode of urinary incontinence in the last 3 months | 2  | 79.7 (60.7-90.9)    | 2.873  | <0.001 | 14.697        | <0.001 | 93.2           |
| Urinary incontinence in the last 4 weeks                 | 26 | 34.3 (29.4-39.6)    | -5.606 | <0.001 | 1628.211      | <0.001 | 98.5           |

CI: Confidence Interval

**Table 4:** UI prevalence by region (within UI)

|                       | n  | Meta Analysis          |         |        | Heterogeneity |        |                |
|-----------------------|----|------------------------|---------|--------|---------------|--------|----------------|
|                       |    | Event Rate (%95 CI)    | Z       | P      | Q-value       | p      | I <sup>2</sup> |
| Mediterranean Region  | 2  | 24.9 (%95CI:18.2-33)   | -5.433  | <0.001 | 16.692        | <0.001 | 94.0           |
| All Regions           | 3  | 28.2 (%95CI:15.5-45.7) | -2.409  | 0.016  | 194.505       | <0.001 | 99.0           |
| Eastern Anatolia      | 8  | 36.7 (%95CI:28.2-46.1) | -2.753  | 0.006  | 226.564       | <0.001 | 96.9           |
| Aegean Region         | 8  | 36.5 (%95CI:28.1-45.8) | -2.818  | 0.005  | 288.136       | <0.001 | 97.6           |
| United Regions        | 1  | 20.9 (%95CI:19.9-21.9) | -43.539 | <0.001 | 0.000         | 1.000  | 0.0            |
| Southeastern Anatolia | 2  | 37.9 (%95CI:33.9-42)   | -5.647  | <0.001 | 0.596         | 0.440  | 0.0            |
| Central Anatolia      | 12 | 42.5 (%95CI:34.2-51.3) | -1.674  | 0.094  | 699.191       | <0.001 | 98.4           |
| Black Sea Region      | 1  | 26.7 (%95CI:23.3-30.4) | -10.843 | <0.001 | 0.000         | 1.000  | 0.0            |
| Marmara Region        | 7  | 39 (%95CI:23.6-56.9)   | -1.211  | 0.226  | 674.856       | <0.001 | 99.1           |

CI: Confidence Interval

effects model according to this method. As no correction was obtained, interpretations were made based on the uncorrected values.

The prevalence value for the random effects model for UI was found to be 34.8% (95% CI: 34.3-35.3), but the I<sup>2</sup> value was over 50%, indicating a heterogeneous structure. Taking this into account, the prevalence value for UI according to the random effects model was found to be 36.7% (95% CI: 32.5-41.1). The prevalence values for other types of UI were 27.5% (95% CI: 21.9–34) for MUI, 31.1% (95% CI: 26–36.6) for SUI, and 18.4% (95% CI: 14.8–22.8) for UUI (Table 2).

The prevalence of UI was determined to be 35.4% (95% CI: 29.7-41.5) in any definition of involuntary urine loss. The prevalence of urinary leakage in the last 3 months was determined to be 79.7% (95% CI: 60.7-90.9), and the prevalence of urinary leakage in the last 4 weeks was determined to be 34.3% (95% CI: 29.4-39.6) (Table 3).

In the Aegean, Eastern Anatolia, Southeastern Anatolia, and Black Sea regions, the I<sup>2</sup> value was below 50%, so the fixed-effect model results were considered. In other regions, the analysis was conducted according to the random effects model. The prevalence value was 24.9% (95% CI: 18.2-33) in the Mediterranean region, 36.7% (95% CI: 28.2-46.1) in the Eastern Anatolia region, 36.5% (95% CI: 28.1-45.8) in the Aegean region, 20.9% (95% CI: 19.9-21.9) in the Aegean and Eastern Anatolia regions, 37.9% (95% CI: 33.9-42) in the Southeastern Anatolia region, 42.5% (95% CI: 34.2-51.3) in the Central Anatolia region, 26.7% in the Black Sea region (95% CI:

23.3–30.4), and 39% in the Marmara region (95% CI: 23.6–56.9)(Table 4).

## Discussion

This meta-analysis, aimed at determining the prevalence of UI, examined the results of 45 studies with a total sample size of 41038. The meta-analysis results are important in that they provide up-to-date and detailed information about the prevalence of UI. In the meta-analysis, the estimated prevalence of urinary incontinence in women aged 15 years and older was found to be 36.7%. In a meta-analysis of studies conducted in developing countries by Mostafaei et al. (2020)<sup>56</sup>, the prevalence of urinary incontinence was found to be 25.7%. In a meta-analysis conducted by Bertuit et al. (2025)<sup>57</sup> in Africa, the prevalence of urinary incontinence in women was estimated to be 24%, ranging from 2% to 80%. In a systematic review by Tahra et al. (2022)<sup>62</sup> that included twenty studies, the prevalence of urinary incontinence in women was determined to be between 5.8% and 45.8%. Thabet et al. (2023)<sup>13</sup> found that the prevalence of urinary incontinence in women aged 18-70 years was 64.1% in their study conducted in Saudi Arabia. Onishi and Shibata (2023)<sup>63</sup>, in their study including 3030 Japanese women, reported that the prevalence of urinary incontinence was 25.5% and increased with age. In a study based on national data by Zhu et al. (2024)<sup>16</sup>, the prevalence of urinary incontinence in Chinese women over the age of 20 was reported to be 16.0%. Mahfouz et al. (2024)<sup>15</sup> reported that the prevalence of urinary incontinence

in women aged 18-85 in Jordan was 64.1%. Wang et al. (2023) reported a prevalence of urinary incontinence of 24.8% in their epidemiological study involving more than 9,500 Chinese women aged 20-70 years<sup>58</sup>

Studies conducted in Gulf countries indicate that the prevalence of UI in women ranges from 20.3% to 54.5%<sup>59</sup>. Sezer Yıldız and Ayrancı (2024) determined that the prevalence of urinary incontinence in Turkish women aged 18–70 was 41.8%.<sup>2</sup> Akan and Sancar (2024)<sup>5</sup> and Dönmez et al. (2024)<sup>6</sup> reported the prevalence of urinary incontinence in Turkish women over the age of 18 to be 28.9% and 34.8%, respectively. The prevalence differences between countries and studies may be attributed to cultural characteristics affecting women's reporting of illness, women's shyness or reluctance, and methodological factors affecting the investigation of urinary incontinence. In the present study, the estimated prevalence among women aged 15 years and older was found to be 31.1% for SUI, 18.4% for UUI, and 27.5% for MUI. A recent study conducted among Chinese women aged 40–65 years revealed a prevalence of 7.4% for SUI, 1.9% for UUI, and 6.5% for MUI.<sup>16</sup> Another study from China showed that the estimated prevalence of SUI, UUI, and MUI among women aged 40-69 was 12.7%, 8.0%, and 4.1%, respectively.<sup>58</sup> A review conducted in developing countries found the estimated prevalence in women aged 18 years and older to be 10.3–15.4% for SUI, 3.4–8.3% for UUI, and 7.0–11.8% for MUI.<sup>56</sup> Another study examining Chinese national data showed that the prevalence of SUI, UUI, and MUI in women aged 20 years and older was 13.1%, 3.0%, and 5.1%, respectively. Another study based on American national data showed that the prevalence of SUI, UUI, and MUI in women aged 20 years and older was 26.0%, 10.0%, and 16.0%, respectively.<sup>60</sup> In the systematic review by Tahra *et al.*<sup>62</sup>, which included twenty studies, the prevalence of SUI, UUI, and MUI was 1.9%-31.8% for SUI, 0.7%-24.4% for UUI, and 2.1%-12.0% for MUI, respectively. In their study conducted in Saudi Arabia, the prevalence of SUI, UUI, and MUI in women aged 18-70 was found to be 15.4%, 25.6%, and 10.15%, respectively.<sup>13</sup> In the study by Onishi and Shibata<sup>63</sup>, the prevalence of SUI, UUI, and MUI in women was determined to be 57.4%,

20.3%, and 16.7%, respectively. In another study conducted with women over the age of 18 in Africa, the prevalence of SUI, UUI, and MUI was 35.0%, 28.0%, and 31.0%, respectively.<sup>57</sup> As can be seen, SUI has the highest prevalence in individual studies and in our meta-analysis. The findings in the literature are consistent with those of our study. Different definitions of UI complicate calculations and produce heterogeneous data.<sup>61</sup> Several definitions of UI that could affect prevalence are found in the study by Mostafaei et al. (2020).<sup>56</sup> For example, the prevalence of UI for any involuntary urine loss, regardless of time frame, is 25.5%. When UI is defined as involuntary urine loss in the last 4 weeks, the prevalence rate is 33.4%. When UI is defined as involuntary urine loss in the previous 3 months, the prevalence rate is 41.2%. In contrast, the prevalence rate of any involuntary urine loss in the last year is 15.6%. In the current study, the prevalence of UI for any involuntary urine loss, regardless of time frame, is 35.4%. When UI is defined as involuntary urine loss within the last 4 weeks, the prevalence rate is 34.3%. When UI is defined as involuntary urine loss within the last 3 months, the prevalence rate is 79.7%. These findings demonstrate that the accurate and reproducible prevalence of UI requires the use of standardised definitions, international guidelines, and nationally and internationally reliable diagnostic tools.

### **Strengths and limitations**

Among the strengths of this study is that it represents the largest epidemiological sample group to date estimating the prevalence of urinary incontinence among women over 15 years of age in Turkey. The fact that this study is the first to show the prevalence of urinary incontinence in women with the largest sample size ever, consisting of a total of 41038 women from seven regions of Turkey, constitutes its most important strength. This meta-analysis study was structured in accordance with PRISMA guidelines, and the use of a transparent methodology and double independent review enhanced the robustness of the study selection.

However, this study also has several limitations. Firstly, it consists of studies based on

self-reported questionnaires without laboratory studies for UI diagnosis. Therefore, a smaller sample size than necessary may result. Secondly, the different definitions and methodologies of urinary incontinence used in the studies included in the meta-analysis created a bias that led to heterogeneity in the analysis of the prevalence of urinary incontinence among women in Türkiye. Additionally, the systematic review should include studies conducted in Türkiye that have been published in both Turkish and English. Therefore, the generalizability of the findings is limited, and accordingly, the study may only be representative of our country. Urinary incontinence is a serious issue because it affects a woman's self-image and self-esteem, fertility, sexual life, and family structure. Determining the true prevalence of urinary incontinence is of critical importance from a public health perspective, as this condition—though common in the female population—is often concealed, met with shame, and significantly reduces quality of life. For this reason, determining the prevalence of urinary incontinence, identifying risk factors, investigating its causes, and developing appropriate strategies and policies for prevention and treatment are becoming increasingly important. At the same time, it is essential for women with UI to lead a good quality of life and have access to treatment and care. It is important for healthcare professionals to provide counseling to increase the public's—particularly women's—level of knowledge regarding urinary incontinence, offer support, identify the difficulties experienced, and minimize them. Developing a policy to raise awareness of urinary incontinence among women in Turkey and to assess urinary incontinence could be beneficial. This would enable interventions to be implemented nationwide. The development of preventive healthcare services for urinary incontinence will contribute to improving women's quality of life. There is a need for studies to determine the impact of preventive approaches targeting potential causes of this health issue on reducing the prevalence of urinary incontinence and enhancing quality of life.

## Conclusion

In this systematic review and meta-analysis, based on data from 45 studies involving 41038 women

aged 15 years and older, the estimated prevalence of UI was found to be 36.7%. This prevalence was found to be affected by the definitions of UI used in screening for UI diagnosis. The estimated prevalence was 31.1% for SUI, 18.4% for UUI, and 27.5% for MUI. The highest overall UI prevalence rate was found in the Central Anatolia region at 42.5%, while the lowest rate was found in the Mediterranean region at 24.9%. The results of this study may guide the planning and provision of healthcare services for the maintenance and improvement of women's health, diagnosis, and treatment. To provide solutions to UI problems that may affect quality of life, it is recommended that studies be conducted using standardised definitions, international guidelines, and nationally and internationally reliable diagnostic tools.

## Conflict of interests

The authors declared no conflicts of interest regarding the research, authorship or publication of this study.

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## Ethical approval

No ethical permission was required for this study.

## Author contributions

The authors of this study have contributed to the preparation of the manuscript. Concept and design: SK; Data collection: SK; HDT; Data analysis and interpretation: SK; Preparation of the manuscript draft: AA; Critical review of the manuscript draft for substantial intellectual content: DÇ; Statistical analysis: SK; Review: SK; HDT; DÇ; Data collection: SK; Preparation of the manuscript: SK; HDT; DÇ; Interpretation of data: SK; data organisation, Preparation of the manuscript: SK; HDT; DÇ; Data collection, software: SK; Review: SK. All authors have reviewed and approved the manuscript of this study.

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