

PATTERN OF URINARY INCONTINENCE AMONG WOMEN AT AGE OF 45 YEAR  
AND OLDER IN PRIMARY HEALTH CENTERS IN MOSUL CITY

\*Farah Shamil Chyad, Dr. Hadeel Ameer Jasim

\*M.B.Ch.B.; M.B.Ch.B./F.I.C.M.S(FM).  
Consultant Family Medicine.

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\*Corresponding Author: Dr. Farah Shamil Chyad

M.B.Ch.B.; M.B.Ch.B./F.I.C.M.S(FM).

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## ABSTRACT

**Background:** The integration of electronic health (e-health) and digital medical resources into medical education has transformed healthcare delivery and training, yet awareness, usage, and challenges surrounding their adoption among medical students, particularly in low- and middle-income countries, remain underexplored. **Aim:** This study aimed to explore the knowledge, attitudes, and practices of undergraduate medical students in Mosul City regarding e-health applications and digital medical resources, and to describe demographic characteristics, digital-resource preferences, and curriculum adequacy for future healthcare digitalization. **Methods:** An analytical cross-sectional study was conducted among 328 undergraduate medical students from the University of Mosul and Ninevah College of Medicine, Iraq, using a structured self-administered online questionnaire. Data were analyzed using IBM SPSS software, and ethical approval was obtained from the Directorate of Health in Nineveh and the Local Scientific Council of the Arab Board of Health Specializations in Family Medicine. **Results:** Most students demonstrated good-to-very-good digital competence. Male students reported significantly higher levels of digital expertise than female students ( $\chi^2 = 21.375$ ,  $df = 4$ ,  $p < 0.001$ ). Tablets (84.1%) were the most commonly used learning device, and 86.6% of students reported using artificial intelligence tools. In contrast, advanced medical platforms such as Medscape (7.6%) and UpToDate (2.1%) were rarely used. The mean knowledge score was  $3.93 \pm 1.126$  (out of 6). The most frequently reported barriers to e-health adoption were inadequate training (57.3%), privacy and security concerns (45.1%), and resistance to change (43.0%). Knowledge, attitude, and expertise scores were positively correlated (all  $p < 0.01$ ). **Conclusion:** Medical students in Mosul and Ninevah possess strong familiarity with e-learning technology, but limited knowledge of e-health applications, especially remote consultation; curriculum integration of e-health modules, structured digital-training programmes, and stronger attention to data-privacy safeguards are recommended.

**KEYWORDS:** e-health; digital medical resources; medical education; telemedicine; digital literacy; barriers to adoption; privacy concerns; medical curriculum; Iraq.

## 1. INTRODUCTION

Urinary incontinence (UI) is the involuntary leakage of urine, a common condition among women, particularly those older than 45 years, that imposes considerable medical, social, and economic burden.<sup>[1,2]</sup> Despite affecting women of all ages, cultures, and backgrounds, UI remains frequently underdiagnosed because of stigma and misconceptions that equate it with normal aging.<sup>[1,3]</sup>

## 1.1 Epidemiology and Risk Factors

The prevalence of UI increases with age, and its subtypes vary accordingly: stress incontinence predominates among younger women, whereas urge and mixed incontinence become more common with advancing age.<sup>[4,5]</sup> Established risk factors include increasing age, higher parity and vaginal delivery, menopause, obesity, smoking, diabetes mellitus, chronic cough, pelvic or urological surgery, recurrent urinary tract infection, and

reduced mobility or cognitive impairment.<sup>[6–10]</sup> Hormonal changes associated with menopause lead to thinning of the urethral and vaginal epithelium and reduced urethral closure pressure, while pelvic floor muscle weakening after childbirth and aging further predisposes women to leakage.<sup>[6,8]</sup>

## 1.2 Diagnosis and Impact on Quality of Life

Clinical diagnosis relies on a detailed voiding history, physical examination, and, when necessary, urodynamic testing; standardized instruments such as the International Consultation on Incontinence Questionnaire–Urinary Incontinence Short Form (ICIQ–UI SF) allow objective grading of severity into mild, moderate, and severe categories.<sup>[9,10]</sup> Beyond its physical burden, UI is strongly associated with anxiety, depression, social withdrawal, and diminished quality of life, yet many affected women do not seek care because of embarrassment or the belief that incontinence is an inevitable part of aging.<sup>[1,11]</sup>

## 1.3 Rationale and Aim of the Study

Despite the substantial global literature on UI, data describing its pattern among women in Iraq, and specifically in Mosul city, remain scarce. Understanding the local prevalence and pattern of UI is essential to guide screening practices and health policy within primary health centers. This study aimed to estimate the frequency and pattern of urinary incontinence among women aged 45 years and older attending primary health centers in Mosul city, and to explore associations between the grade of incontinence and sociodemographic, gynecological, and medical characteristics.

## 1.4 Specific Objectives

1. To describe the sociodemographic characteristics of the studied sample.
2. To evaluate possible contributing factors for urinary incontinence, including medical, gynecological, and surgical conditions.
3. To identify the pattern of urinary incontinence.
4. To explore associations between the grade of urinary incontinence and sociodemographic, medical, and gynecological characteristics.

## 2. PATIENTS AND METHODS

### 2.1 Study Design and Setting

A cross-sectional study was conducted at four primary health centers in Mosul city, Nineveh Governorate — Al-Aarby and Al-Karama primary health centers on the left side of the city, and Tamuz and Al-Gharbe primary health centers on the right side — selected by simple randomization. Administrative approval was obtained from the Scientific Council of Family and Community Medicine of the Arab Board for Health Specializations and the Nineveh Directorate of Health, and verbal informed consent was obtained from each participant after explanation of the study objectives.

### 2.2 Study Population

Women aged 45 years and older of any nationality or religion attending the selected centers were eligible. Women younger than 45 years, pregnant women, post-natal women, and those who declined participation were excluded.

### 2.3 Study Period and Sample Size

Data were collected between 2 January and 30 June 2025. The sample size was calculated using the standard prevalence formula  $n = Z^2P(1-P)/d^2$ , based on an expected global UI prevalence of 24.9%<sup>[4]</sup>, yielding a minimum requirement of 287 participants; 315 women were ultimately enrolled to strengthen the study.

### 2.4 Pilot Study and Data Collection Tool

A pilot study on 20 women confirmed the clarity, completeness, and feasibility of the questionnaire, which required approximately 10 minutes to complete and had a 100% response rate. Data were collected through a structured, interviewer-administered questionnaire covering demographic characteristics (age, educational level, marital status, occupation), gynecological history (parity, number of vaginal deliveries, menopausal status), and clinical/surgical history (diabetes, hypertension, urinary tract infection, chronic constipation, neurological disorder, pelvic surgery, and prior surgery for incontinence). The pattern and severity of urinary leakage were assessed using the validated ICIQ–UI SF, which scores frequency, amount, and impact of leakage on a scale of 0–21, classified as mild (0–7), moderate (8–13), or severe ( $\geq 14$ ).<sup>[9]</sup>

## 3. Statistical Analysis

Data were summarized in Microsoft Excel 2010 and analyzed using IBM-SPSS version 26. All variables were categorical and are presented as frequencies and percentages.

- The chi-square test for goodness of fit was used to assess differences in distribution across categories.
- A  $p\text{-value} \leq 0.05$  was considered statistically significant.

## 4. RESULTS

The study included 315 women. Table 1 shows the distribution of the sample according to sociodemographic characteristics. Age was distributed as 24.8% below 55 years, 33.3% between 55 and 65 years, and 41.9% aged 65 years or older ( $p=0.001$ ). Regarding educational level, 42.9% had university education while the lowest proportion (10.1%) had only primary education ( $p<0.001$ ). Most women were married (69.2%), followed by widowed (23.2%), single (4.4%), and divorced (3.2%) ( $p<0.001$ ). Concerning occupation, 59.4% were unemployed, and 40.6% were employed.

Table 2 presents the gynecological history of the sample. Parity of 1–4 was reported in 56.5%, compared with 37.8% with parity  $>4$  and 5.7% nulliparous ( $p<0.001$ ). More than four vaginal deliveries were reported by

37.3%, compared with 36.4% for three-to-four and 26.3% for one-to-two deliveries ( $p<0.001$ ). Menopause was present in 78.1% of women. Table 3 shows that history of diabetes mellitus, hypertension, urinary tract

infection, chronic constipation, neurological disorder, pelvic surgery, and surgery for urinary incontinence were all significantly distributed within the studied sample.

**Table 1: Distribution of the studied sample according to sociodemographic characteristics.**

| Characteristic  | Category         | Frequency | %     |
|-----------------|------------------|-----------|-------|
| Age group       | 45–<55           | 78        | 24.8  |
|                 | 55–<65           | 105       | 33.3  |
|                 | ≥65              | 132       | 41.9  |
| Education level | Illiterate       | 86        | 27.3  |
|                 | Primary school   | 32        | 10.1  |
|                 | Secondary school | 62        | 19.7  |
|                 | University       | 135       | 42.9  |
| Marital status  | Single           | 14        | 4.4   |
|                 | Married          | 218       | 69.2  |
|                 | Widow            | 73        | 23.2  |
|                 | Divorced         | 10        | 3.2   |
| Occupation      | Employed         | 128       | 40.6  |
|                 | Unemployed       | 187       | 59.4  |
| Total           |                  | 315       | 100.0 |

**Table 2: Distribution of the studied sample according to gynecological history.**

| Characteristic            | Category       | Frequency | %     |
|---------------------------|----------------|-----------|-------|
| Parity                    | Nil            | 18        | 5.7   |
|                           | 1–4            | 178       | 56.5  |
|                           | >4             | 119       | 37.8  |
| Total                     |                | 315       | 100   |
| No. of vaginal deliveries | One–two        | 78        | 26.3  |
|                           | Three–four     | 108       | 36.4  |
|                           | More than four | 111       | 37.3  |
| Total                     |                | 297 **    | 100   |
| Menopause                 | Yes            | 246       | 78.1  |
|                           | No             | 69        | 21.9  |
| Total                     |                | 315       | 100.0 |

**Table 3: Distribution of the studied sample according to clinical conditions and surgical history.**

| Clinical condition / surgical history       | Present, No.(%) | Absent, No.(%) |
|---------------------------------------------|-----------------|----------------|
| History of diabetes mellitus                | 73 (23.2)       | 242 (76.8)     |
| History of hypertension                     | 106 (33.7)      | 209 (66.3)     |
| History of urinary tract infection          | 101 (32.1)      | 214 (67.9)     |
| History of chronic constipation             | 45 (14.3)       | 270 (85.7)     |
| History of neurological disorder            | 17 (5.4)        | 298 (94.6)     |
| History of pelvic surgery                   | 114 (36.2)      | 201 (63.8)     |
| History of surgery for urinary incontinence | 12 (3.8)        | 303 (96.2)     |

Table 4 shows the distribution of the sample according to the pattern of urinary incontinence. Urine leakage occurred several times a day in 20.3%, about once a week in 3.8%, and constantly in 11.7% ( $p<0.001$ ). The amount of urine leaked was large in 6.7%, moderate in 20.0%, and small in 27.9% ( $p<0.001$ ). Leakage occurred mainly when coughing or sneezing (21.6%), before reaching the toilet (14.6%), during physical activity or exercise (6.3%), while asleep (1.3%), for no obvious reason (5.7%), or constantly (0.3%) ( $p<0.001$ ). Among the 172 women whose daily life was affected by leakage,

16.3% had a nil score, 61.6% a moderate score, and 22.1% a severe score.

According to the ICIQ-UI-SF grading, Figure 1 shows that 40.1% of affected women had a mild grade, 45.3% a moderate grade, and 14.6% a severe grade of urinary incontinence.

**Table 4: Distribution of the studied sample according to the pattern of urinary incontinence.**

| Item                                    | Response                            | Frequency | %    | p-value* |
|-----------------------------------------|-------------------------------------|-----------|------|----------|
| How often do you leak urine?            | Never                               | 143       | 45.4 | 0.000    |
|                                         | About once a week or less often     | 12        | 3.8  |          |
|                                         | Two or three times per week         | 44        | 14.0 |          |
|                                         | About once a day                    | 15        | 4.8  |          |
|                                         | Several times a day                 | 64        | 20.3 |          |
|                                         | All the time                        | 37        | 11.7 |          |
| How much urine do you leak?             | None                                | 143       | 45.4 | 0.000    |
|                                         | Small amount                        | 88        | 27.9 |          |
|                                         | Moderate amount                     | 63        | 20.0 |          |
|                                         | Large amount                        | 21        | 6.7  |          |
| When does urine leak?                   | Never                               | 143       | 45.4 | 0.000    |
|                                         | Before you can get to the toilet    | 46        | 14.6 |          |
|                                         | When you cough or sneeze            | 68        | 21.6 |          |
|                                         | When you are asleep                 | 4         | 1.3  |          |
|                                         | When physically active / exercising | 20        | 6.3  |          |
|                                         | When finishing urinating or dressed | 15        | 4.8  |          |
|                                         | For no obvious reason               | 18        | 5.7  |          |
|                                         | All the time                        | 1         | 0.3  |          |
| Interference with everyday life (n=172) | Nil score = 0                       | 28        | 16.3 | 0.000    |
|                                         | Moderate $\leq 4$                   | 106       | 61.6 |          |
|                                         | Severe $\geq 5$                     | 38        | 22.1 |          |

\*Chi-square test for goodness of fit.

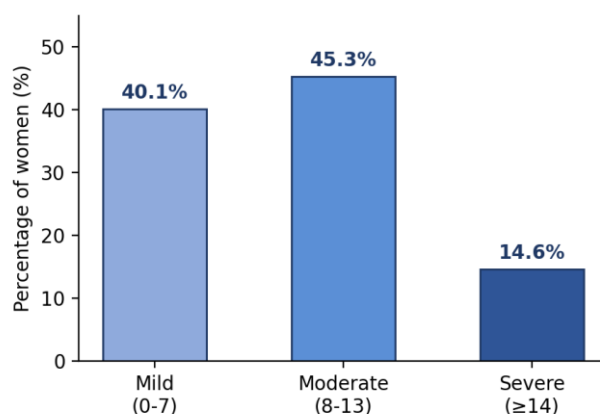
**Figure 1: Distribution of the studied sample according to grade of urinary incontinence.**

Table 5 compares the grades of urinary incontinence in relation to sociodemographic and gynecological characteristics. The moderate and severe grades were more common among women aged  $\geq 65$  years (62.8% and 68.0%, respectively) compared with the mild grade ( $p < 0.001$ ). Higher educational level prevailed among moderate and severe grades, while 34.8% and 43.5% of the mild grade were illiterate and university-educated women, respectively ( $p = 0.008$ ). Employment accounted for 33.3% of the mild grade compared with 44.9% and 72.0% of the moderate and severe grades, respectively ( $p = 0.004$ ). Regarding the number of vaginal deliveries, more than four deliveries were more frequent among moderate and severe grades ( $p = 0.013$ ). Menopause was significantly more frequent among women with moderate and severe grades ( $p < 0.001$ ), whereas marital status showed no significant association with grade

( $p = 0.883$ ).

Table 6 shows that diabetes mellitus, neurological disease, and pelvic surgery were more frequent among women with the severe grade (44.0%, 16.0%, and 60.0%, respectively) compared with the moderate (35.9%, 10.3%, and 28.2%) and mild grades (27.5%, 4.3%, and 52.2%) ( $p < 0.001$ ). In contrast, hypertension, urinary tract infection, chronic constipation, and prior surgery for incontinence were more frequently associated with the mild grade ( $p < 0.001$ ).

**Table 5: Comparison of the grades of urinary incontinence in relation to sociodemographic and gynecological history.**

| Variable                  | Category       | Non (n=143) | Mild (n=69) | Moderate (n=78) | Severe (n=25) | p-value |
|---------------------------|----------------|-------------|-------------|-----------------|---------------|---------|
| Age                       | 45–<55         | 45 (31.5)   | 18 (26.1)   | 11 (14.1)       | 4 (16.0)      | 0.000*  |
|                           | 55–<65         | 53 (37.0)   | 30 (43.5)   | 18 (23.1)       | 4 (16.0)      |         |
|                           | ≥65            | 45 (31.5)   | 21 (30.4)   | 49 (62.8)       | 17 (68.0)     |         |
| Educational level         | Illiterate     | 44 (30.8)   | 24 (34.8)   | 13 (16.7)       | 5 (20.0)      | 0.008*  |
|                           | Primary        | 12 (8.4)    | 8 (11.6)    | 7 (8.9)         | 5 (20.0)      |         |
|                           | Secondary      | 23 (16.1)   | 7 (10.1)    | 23 (29.4)       | 9 (36.0)      |         |
|                           | University     | 64 (44.8)   | 30 (43.5)   | 35 (44.9)       | 6 (24.0)      |         |
| Marital status            | Single         | 6 (4.2)     | 3 (4.3)     | 5 (5.4)         | 0 (0.0)       | 0.883** |
|                           | Married        | 100 (69.9)  | 45 (65.3)   | 54 (69.2)       | 19 (76.0)     |         |
|                           | Widow          | 32 (22.4)   | 20 (29.0)   | 16 (20.5)       | 5 (20.0)      |         |
|                           | Divorced       | 5 (3.5)     | 1 (1.4)     | 3 (3.8)         | 1 (4.0)       |         |
| Occupation                | Employed       | 52 (36.4)   | 23 (33.3)   | 35 (44.9)       | 18 (72.0)     | 0.004*  |
|                           | Not employed   | 91 (63.6)   | 46 (66.7)   | 43 (55.1)       | 7 (28.0)      |         |
| Parity                    | Nil            | 10 (7.0)    | 2 (2.9)     | 6 (7.7)         | 0 (0.0)       | 0.013*  |
|                           | 1–4            | 93 (65.0)   | 32 (46.4)   | 42 (53.8)       | 11 (44.0)     |         |
|                           | >4             | 40 (28.0)   | 35 (50.7)   | 30 (38.5)       | 14 (56.0)     |         |
| No. of vaginal deliveries | Nil            | 10 (7.0)    | 2 (2.9)     | 6 (7.7)         | 0 (0.0)       | 0.013** |
|                           | One–two        | 51 (35.7)   | 11 (16.0)   | 15 (19.2)       | 1 (4.0)       |         |
|                           | Three–four     | 47 (32.9)   | 19 (27.5)   | 29 (37.2)       | 13 (52.0)     |         |
|                           | More than four | 35 (24.4)   | 37 (53.6)   | 28 (35.9)       | 11 (44.0)     |         |
| Menopause                 | Yes            | 83 (58.0)   | 66 (95.7)   | 74 (94.9)       | 23 (92.0)     | 0.000*  |
|                           | No             | 60 (42.0)   | 3 (4.3)     | 4 (5.1)         | 2 (8.0)       |         |

\*Chi-square test; \*\*Freeman-Halton exact test.

**Table 6: Comparison of the grades of urinary incontinence in relation to medical and surgical history.**

| Condition                | Status  | Non (n=143) | Mild (n=69) | Moderate (n=78) | Severe (n=25) | p-value |
|--------------------------|---------|-------------|-------------|-----------------|---------------|---------|
| Diabetes mellitus        | Present | 15 (10.5)   | 19 (27.5)   | 28 (35.9)       | 11 (44.0)     | 0.000*  |
|                          | Absent  | 128 (89.5)  | 50 (72.5)   | 50 (64.1)       | 14 (56.0)     |         |
| Hypertension             | Present | 51 (35.7)   | 31 (44.9)   | 12 (15.4)       | 8 (32.0)      | 0.000*  |
|                          | Absent  | 92 (64.3)   | 38 (55.1)   | 66 (84.6)       | 17 (68.0)     |         |
| Urinary tract infection  | Present | 37 (25.9)   | 31 (44.9)   | 23 (29.5)       | 10 (40.0)     | 0.000*  |
|                          | Absent  | 106 (74.1)  | 38 (55.1)   | 55 (79.5)       | 15 (60.0)     |         |
| Constipation             | Present | 7 (4.9)     | 24 (34.8)   | 11 (14.1)       | 3 (12.0)      | 0.000*  |
|                          | Absent  | 136 (95.1)  | 45 (65.2)   | 67 (85.9)       | 22 (88.0)     |         |
| Neurological disease     | Present | 2 (1.4)     | 3 (4.3)     | 8 (10.3)        | 4 (16.0)      | 0.000** |
|                          | Absent  | 141 (98.6)  | 66 (95.7)   | 70 (89.7)       | 21 (84.0)     |         |
| Pelvic surgery           | Present | 41 (28.7)   | 36 (52.2)   | 22 (28.2)       | 15 (60.0)     | 0.000*  |
|                          | Absent  | 102 (71.3)  | 33 (47.8)   | 56 (71.8)       | 10 (40.0)     |         |
| Surgery for incontinence | Present | 3 (2.1)     | 5 (7.2)     | 4 (5.1)         | 0 (0.0)       | 0.000** |
|                          | Absent  | 140 (97.9)  | 64 (92.8)   | 74 (94.9)       | 25 (100.0)    |         |

\*Chi-square test; \*\*Freeman-Halton exact test.

## 5. DISCUSSION

This cross-sectional study of 315 women aged 45 years and older attending primary health centers in Mosul city found that more than half of the sample (54.6%) reported some degree of urinary incontinence, with a predominance of moderate grade (45.3% of affected women), followed by mild (40.1%) and severe (14.6%) grades. This pattern is broadly consistent with regional reports; Alshehri et al. found a comparable distribution of UI severity among women in the Asir region of Saudi Arabia using the same ICIQ-UI SF instrument<sup>[6]</sup>, while

Thabet et al. similarly reported a high burden of UI among Saudi women attending primary care.<sup>[8]</sup>

Age was significantly associated with grade of incontinence, with moderate and severe grades markedly more frequent among women aged 65 years or older. This finding agrees with the well-established observation that UI prevalence and severity rise with advancing age owing to progressive pelvic floor weakening, hormonal decline, and accumulation of comorbidities.<sup>[4,5,11]</sup> Milsom and Gyhagen similarly reported that both prevalence and



bother of UI increase steadily after midlife.<sup>[4]</sup>

Menopause was strongly associated with higher grades of incontinence in the present study, in line with evidence that estrogen deficiency after menopause reduces urethral closure pressure and weakens periurethral supportive tissue.<sup>[6,8]</sup> Likewise, a greater number of vaginal deliveries was associated with more severe grades of UI, supporting the recognized role of vaginal childbirth in pelvic floor and pudendal nerve injury that predisposes to later incontinence.<sup>[11,12]</sup> Rath et al. similarly identified parity and vaginal delivery as significant predictors of UI among postmenopausal women.<sup>[12]</sup>

Diabetes mellitus, neurological disease, and history of pelvic surgery were significantly more common among women with severe UI in this study. Diabetes is a well-documented risk factor for UI through autonomic neuropathy and detrusor dysfunction, consistent with findings reported by Gormley et al. in the AUA/SUFU clinical guideline.<sup>[10]</sup> Pelvic surgery may disrupt the supportive fascia and innervation of the lower urinary tract, a mechanism supported by the association between gynecological surgery and subsequent incontinence described in the literature.<sup>[5,13]</sup>

Notably, hypertension, urinary tract infection, chronic constipation, and prior incontinence surgery were more frequent among women with mild UI in this sample, which may reflect earlier medical attention and management among women who already sought care for lower urinary tract symptoms, rather than a true protective effect. This underscores that incontinence associated with reversible causes such as infection may respond better to treatment, resulting in milder residual symptoms, as also observed by Bardsley in her overview of UI assessment and management in primary care.<sup>[3]</sup>

The most frequent trigger of leakage in this study was coughing or sneezing (21.6%), consistent with a large stress-incontinence component among the sample, which mirrors findings from Kim and Kwak among working women<sup>[14]</sup> and Lucia et al. among sexually active women in Ecuador, who also identified physical exertion and increased intra-abdominal pressure as principal precipitants of leakage.<sup>[18]</sup> Nearly one-third of affected women reported that incontinence moderately or severely interfered with their daily activities, a finding that parallels the substantial quality-of-life burden documented by Reigota et al. among women with UI and multimorbidity<sup>[11]</sup> and by Vinker et al. in a large primary-care based study.<sup>[15]</sup>

Educational level and employment status were also significantly associated with grade of incontinence in this study, with higher grades more common among employed and more highly educated women, possibly reflecting greater awareness, more willingness to

disclose symptoms, or occupational factors such as prolonged standing and reduced access to toileting during work hours, similar to patterns described by Kim and Kwak in relation to occupational status and UI.<sup>[14]</sup> Taken together, these findings highlight the multifactorial nature of UI in midlife and older women and reinforce the importance of proactive screening within primary health care rather than relying on women to volunteer symptoms, an approach also advocated by Najafi et al.<sup>[16]</sup> and Ofori et al. in similar community-based studies.<sup>[17]</sup>

This study has some limitations. Its cross-sectional design precludes causal inference between the identified factors and grade of incontinence, and reliance on self-reported data collected through interview may be subject to recall and social-desirability bias, particularly given the sensitive nature of the topic. Nonetheless, the use of a validated, widely applied instrument (ICIQ-UI SF) and a reasonably large sample recruited from four primary health centers representing different areas of Mosul city are notable strengths that support the reliability of the reported pattern of urinary incontinence in this population.

## 6. CONCLUSION AND RECOMMENDATIONS

Urinary incontinence is common among women aged 45 years and older attending primary health centers in Mosul city, affecting more than half of the studied sample, with a predominantly moderate grade of severity. Older age, menopause, higher parity and number of vaginal deliveries, diabetes mellitus, neurological disease, and history of pelvic surgery were significantly associated with more severe grades of incontinence, while stress-type triggers such as coughing and sneezing were the most common precipitants of leakage.

Routine screening for urinary incontinence should be incorporated into primary health care visits for women aged 45 years and older, particularly those who are postmenopausal, multiparous, or have diabetes mellitus or a history of pelvic surgery. Health education programs addressing pelvic floor exercises and early reporting of symptoms are recommended to reduce the burden of moderate-to-severe incontinence and improve quality of life. Further multicenter studies are recommended to confirm these findings across other regions of Iraq.

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