

Research Article

Prevalence of Urinary Incontinence Among Elderly Women Attending Primary Healthcare Centers in Makkah, Saudi Arabia

Nahla Hariri^{*1}, Hamsah Alqashqri¹

¹Department of Community Medicine and Health Care for Pilgrims, Faculty of Medicine, Umm Al-Qura University, Makkah 24538, Saudi Arabia

ARTICLE INFO

Received: 13/10/2023

Revised: 05/12/2023

Accepted: 14/01/2024

Keywords:

Urinary incontinence,
Primary healthcare,
Elderly women, Primary
healthcare centres,
Pelvic surgery, Menopause.

*Corresponding author:

Nahla Hariri
E: nhhariri@uqu.edu.sa

ABSTRACT

Background: Urinary incontinence (UI), is characterized by the involuntary release of urine. It is increasingly prevalent among older people, further increasing their health and economic burden. It affects both men and women, but it is more prevalent in older women.

Methods: This analytical cross-sectional study aimed to determine the prevalence of UI among older women visiting primary health care centers in Makkah, Saudi Arabia, and to identify the associated risk factors.

Results: The study included 390 older women, most of them being 60–69 years old. Most married women had children. Most participants had children, with 72.30% having ≥ 4 children, and more than half were through natural delivery (61.5%). Furthermore, 34.1% of the participants were overweight, and 62.3% reported experiencing UI, most of whom (74.9%) reported urge-only or urge-predominant leakage—i.e., they experienced leakage when they felt the urge to empty their bladder but could not get to the toilet fast enough. Bivariate analysis revealed the following factors to be associated with UI: marital status, Family history of UI, parity, mode of delivery, and BMI (all $p < 0.001$). The risk factors for women with UI were: family history of UI (odds ratio (OR) = 9.63, 95% CI: 2.51-36.96; $P = 0.001$), parity (≥ 4 children) (OR = 6.06, 95% CI: 3.00-12.30; $P < 0.001$), parity (1-3 children) (OR = 3.91, 95% CI: 1.70-8.97; $P = 0.001$), and history of pelvic surgery (OR = 4.77, 95% CI: 1.54-21.2; $P = 0.016$).

Conclusion: UI is prevalent among older women in primary healthcare centers in Makkah, Saudi Arabia. Primary care physicians should consider actively screening older women for UI, especially since most women with UI may not seek medical help.

INTRODUCTION

Urinary incontinence (UI), characterised by the involuntary release of urine, is a prevalent condition that is often inadequately addressed (Abrams et al., 2010; Nightingale, 2020). It is increasingly prevalent among older people, further increasing their health and economic burden. It affects both men and women but is more prevalent in older women. There was a two-fold increase in women compared to older men (Aniuliene et al., 2016; Griebing, 2009). In women, bladder malfunction and weak pelvic floor muscles due to pregnancy and delivery or during menopause can increase UI risk (Aoki et al., 2017; Lukacz et al., 2017; Norton & Brubaker, 2006). UI can be stress incontinence and urge (urgency) incontinence. The International Urogynaecology Association

and the International Continence Society define stress incontinence as urine leakage caused by coughing, sneezing, or another effort. Urge (Urgency) incontinence is defined as a sudden need to urinate that is difficult to control. They frequently coexist and are called mixed incontinence (Aoki et al., 2017; Haylen et al., 2010; Minassian et al., 2017). Approximately half of adult women are believed to experience UI, but only 25%–61% of community-dwelling women with symptomatic UI actively seek medical attention. Patients may exhibit hesitancy in initiating conversations on their incontinence and urine symptoms, mostly caused by feelings of embarrassment, limited understanding of available treatment modalities, and apprehension toward surgical interventions (Abufaraj et al., 2021; Elstad et al., 2010).

Doi: <https://doi.org/10.54940/ms73321226>

1658-4740/© 2024 by the Authors. Published by *J. Umm Al-Qura Univ. Med. Sci.* This is an open-access article distributed under the terms and conditions of the [Creative Commons Attribution-Noncommercial 4.0 International License \(CC BY-NC\)](https://creativecommons.org/licenses/by-nc/4.0/)

More than 200 million people globally have UI, with women being more affected. In Egypt, for example, 80% of older women have UI, with the most common type being mixed UI (Aly et al., 2020). Among Jordanian women aged 35–65 years, 55.1% have experienced UI symptoms (AlAzab et al., 2021). In Saudi Arabia, the estimated UI prevalence is 36%–48% (Al-Badr et al., 2012; Al-Badr et al., 2022; Almutairi et al., 2021; Alshehri et al., 2022; Altaweel & Alharbi, 2012; Thabet et al., 2023). In Riyadh, 41.7% of women aged 20–50 years have UI (Almutairi et al., 2021). In the Asir region, in a cross-sectional study of women aged ≥ 13 years, almost half (47.5%) had UI (Alshehri et al., 2022). Another study conducted in Jeddah reported that 41.4% of women experienced UI (Al-Badr et al., 2012). Saudi national survey examined the prevalence of pelvic floor dysfunction among 2,289 nonpregnant women aged ≥ 18 years who attended primary healthcare centres across 13 regions of Saudi Arabia. The study found that 36.3% of women had UI, with 31.7% of them having stress UI and 22.9% having urge UI (Al-Badr et al., 2022). UI prevalence is likely to be greatly underestimated and varied between studies (Haylen et al., 2007).

Most older people do not seek medical help for UI for many reasons. They may believe that UI is a natural part of ageing or postpone examination because they are embarrassed by incontinence or dread intrusive tests (Vethanayagam et al., 2017; Yan et al., 2022). Medical and health staff rarely inquire about UI in primary care clinics and hospitals (Mazloomdoost et al., 2017). Furthermore, patients rarely begin incontinence conversations (Horrocks et al., 2004). According to a study conducted in Saudi Arabia, a significant proportion of participants refrained from seeking assistance for their condition because of various factors, such as misunderstandings around UI and the ageing process, limited access to treatment options, and feelings of humiliation associated with discussing such symptoms with others (Alshammari et al., 2020).

There is a higher risk of urinary incontinence among the elderly who suffer from chronic physical health conditions. There is an increase in the number of patients with UI with chronic diseases such as diabetes, Parkinson's disease, and dementia (such as Alzheimer's disease) (Griebing, 2009). A study found mixed urinary incontinence was associated with hypertension (OR 1.31, 95% CI 1.02–1.60), cardiovascular disease (OR 1.62, 95% CI 1.26–2.10) and diabetes (OR 1.61, 95% CI 1.28–2.01) (Daugirdas et al., 2020). Another recent study reported that in patients with chronic health conditions, the odds of urinary incontinence were twice as high (adjusted odds ratio [OR] 2.42, 95% confidence interval [CI] 2.02–2.89) (Scime et al., 2022).

No study has examined the prevalence of UI among older women in primary healthcare settings in Makkah, Saudi Arabia. Consequently, we investigated the prevalence of UI among older women in Makkah and identified the potential risk factors for UI among them.

METHODS AND MATERIALS

Study design and setting

This analytical cross-sectional study included older women (aged ≥ 60 years) who were Saudi citizens and visited primary health care clinics in Makkah, Saudi Arabia, from May to July 2023. We excluded women with significant communication problems, such as deafness and stroke.

The health authorities stratified Makkah's living areas into four districts (north, east, west, and south). Four primary healthcare centres (PHCCs) in Makkah were chosen randomly from each district. Subsequently, multi-stage cluster random sampling was employed to select older women who visited the clinics irrespective of their purpose of visit.

To obtain authorisation for survey implementation, the researchers-initiated communication with the director of the PHCC district and the director of the PHCC after ethical approval was granted, providing a comprehensive explanation of the study's purpose and methodology. In the subsequent stage, at the PHCC visit during data collection, women were asked to assess their weight and height with the help of the nurse clinic and then meet with the researchers to be interviewed. The participants were individually approached and provided with a cover letter about the study. By agreeing to personal interviews, the participants implicitly and verbally expressed their agreement to participate in the study.

Sample size calculation: The sample size was determined using a method incorporating the population size of old women in Makkah, the population percentage, a 95% confidence interval (CI), and a 5% margin of error. The projected prevalence of 36% was derived from prior recent research conducted in a Saudi national survey (Al-Badr et al., 2022). Eventually, a sample size of 390 participants was determined.

Questionnaire: Data were collected through in-person interviews with the participants. The questionnaire had two sections: the first section included the 3 'Incontinence Questions' (3IQ) Questionnaire, which is used to differentiate between stress, urge, and mixed incontinence. Stress incontinence is defined as urine leakage caused by coughing, sneezing, or other effort. Urgency incontinence is defined as a sudden need to urinate that is difficult to control. Stress and urge incontinence frequently coexist and are referred to as mixed incontinence. The questionnaire comprises three questions, taking merely 30 seconds to finish. It was developed primarily to assist primary care physicians in initiating non-invasive therapy and reducing the number of referrals to specialists. The 3IQ has a sensitivity of 0.75 (95% CI: 0.68–0.81), a specificity of 0.77 (95% CI: 0.69–0.84), and a positive likelihood ratio of 3.29 (95% CI: 2.39–4.51) (Brown et al., 2006).

The first question asks if the woman has experienced urine leakage (even a small amount) during the last 3 months (yes or no). If not, the researcher stopped here. If yes, the second question attempts to identify more details regarding the urinary leakage (select all that apply): (a) When were you performing some physical activity, such as coughing, sneezing, lifting, or exercising? (b) When you had the urge or feeling that you needed to empty your bladder but could not get to the toilet fast enough? (c) Without physical activity and a sense of urgency? The third question is whether a woman leaked urine most often during the last 3 months (choose only one): (a) When you perform some physical activities, such as coughing, sneezing, lifting, or exercising? (Indicates stress-only or stress-predominant UI) (b) When did you have the urge or feeling that you needed to empty your bladder but could not get to the toilet fast enough? (Indicates urge-only or urge-predominant UI) (c) Without physical activity or a sense of urgency? (Indicates other cause-only or other cause-predominant UI) (d) About equally as often with physical activities as with a sense of urgency? (Indicates mixed UI).

The second section included demographic information about age, marital status, parity, mode of delivery, smoking habits, history of UI in the family, living with family, weight, and height to calculate body mass index (BMI). The questionnaire also included questions about the medical history, history of pelvic surgery, any medications (such as hormone replacement therapy, diuretic medication, antihistamines, analgesic and sedatives, anticholinergics, cardiac medications, Angiotensin-Converting Enzyme inhibitors, alpha-agonists, alpha-1-blockers, antiarrhythmics, antidepressants and antipsychotics), impaired functional status (e.g. the inability to go to the toilet alone or in need of help with showering), participation in high-impact activities (including jumping and running), and daily consumption of artificial sweeteners.

Statistical analysis: SPSS (IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp) was used for all statistical analyses. The categorical variables are presented as frequencies and percentages. The chi-square test was used to show the association between the urine leakage (even a small amount) and the sociodemographic data to present frequencies, percentages, and P values. Logistic regression was constructed to predict the spread of UI based on the statistically significant sociodemographic data for each primary outcome. The regression results are presented as odds ratios and their respective 95% confidence intervals. $P < 0.05$ was set as statistically significant.

RESULTS

Sociodemographic data

A total of 390 elderly participants were included in this study. Most participants fell into the age category of 60–69 years (86.9%). Most participants were married

(66.9%). Regarding the method of previous births, the participants were asked about their childbirth history. A significant portion of the elderly participants reported having natural deliveries only (61.5%). Most participants reported having parity (≥ 4 children) (72.3%). The study examined whether participants had a family history of UI. A substantial proportion of participants reported that neither their mother nor siblings suffered from UI (61.5%), most were non-smokers (93.8%), and 93.8% reported living with their families. Additionally, the participants' BMI distribution varied, with the majority classified as overweight (34.1%), as seen in Table 1.

Descriptive analysis showing medical history, medications, history of pelvic surgeries, and daily habits

Table 2 summarises the participant's medical history and underlying conditions. Among the participants, 43.1% reported having no significant medical history. More than half (59.5%) reported not using any of the listed medicines. Most participants (89.2%) reported not undergoing any pelvic surgery. Most participants (90.0%) reported that they did not have a poor functional status and could independently go to the toilet and perform bathing activities. Regarding engagement in high-impact activities, including jumping and running, 93.8% indicated that they did not participate in such activities. More than half (55.4%) did not include artificial sweeteners in their daily diet; most participants were nonsmokers. Finally, 93.8% of the participants reported living with their families.

The participants were asked about the frequency of urine leakage over the past 3 months (Figure 1). A significant majority (62.3%) reported experiencing urine leakage during this period, and 74.9% reported having urge-only or urge-predominant leakage—i.e., they experienced leakage when they felt the urge to empty their bladder but could not get to the toilet fast enough. Furthermore, among those who reported leakage, 62.0% indicated that leakage when they felt the urge to empty their bladder but could not get to the toilet fast enough. Furthermore, among those who reported leakage, 62.0% indicated that they experienced urge-only or urge-predominant leakage most frequently (Figure 2).

Association between sociodemographic data and urine leakage (even a small amount)

Age was significantly associated with UI ($P = 0.025$). Among participants aged 60–69 and ≥ 70 years, 60.2% and 76.5% reported having UI. Marital status was significantly associated with UI among older participants ($P < 0.001$). Among the married participants, 62.1% reported UI. The participants who had natural deliveries (76.3%) had a higher prevalence of UI compared with those without any previous births (26.7%; $P < 0.001$). The participants with a family history of UI

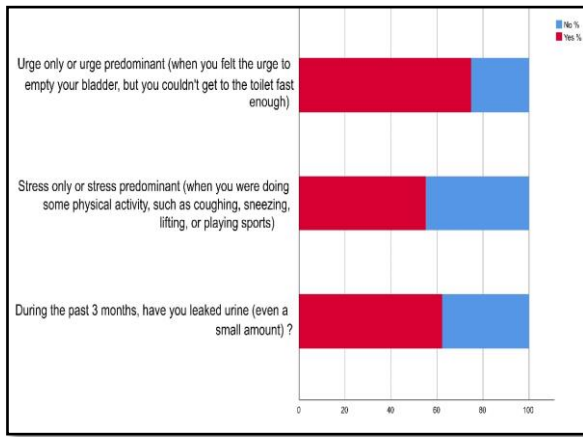


Figure 1: 3IQs: (Question 1) Urine leakage during the past 3 months (% of participants responded 'YES=Red; NO= Blue').

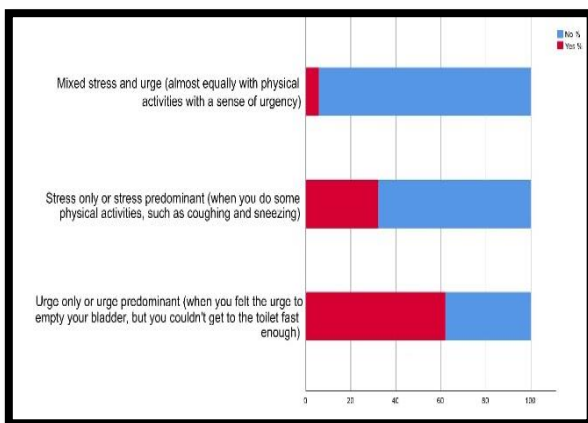


Figure 2: 3IQs: (Question 2) Urine leakage most often during the past 3 months (% of participants responded 'YES=Red; NO= Blue').

reported a higher prevalence of UI. Notably, 68.8% of the 0.001). The participants with a family history of UI reported a higher prevalence of UI. Notably, 68.8% of the participants with ≥ 4 children had UI compared with 26.7% of those with null parity ($P < 0.001$). Furthermore, BMI was significantly associated with UI ($P < 0.001$). The participants with class III obesity had the highest UI prevalence (96.2%), followed by those with class I obesity (69.7%) (Table 3).

Relationship between sociodemographic data and urine leakage: A multivariable logistic regression model further used these significantly associated factors as independent variables. However, we excluded two variables due to high multicollinearity (having a mother/sister suffer from urinary incontinence and living with family), and we excluded four binary variables that had zero frequencies in a specific category (normal pressure hydrocephalus, fecal incontinence, receiving hormone replacement therapy, and undergoing pelvic radiation). Results of the final model indicated that the risk of incontinence was independently associated with the presence of a

family history of UI. Those who reported that both their mother or sisters had UI had an odds ratio of 9.63 (95% CI: 2.51–36.96, $P = 0.001$), further highlighting the increased risk associated with a family history of UI. The participants who had parity (≥ 4 children) {odds ratio of 6.06 (95% CI: 2.989–12.295, $P < 0.001$) and parity (1–3 children) {odds ratio of 3.913 (95% CI: 1.707–8.970, $P = 0.001$) were predicted to have a higher incidence of UI compared with those with null parity (Table 4).

DISCUSSION

We examined UI prevalence and identified the associated risk factors among older women in Saudi Arabia. Our data indicated that UI prevalence was 62.3%, with most women having urge-only or urge-predominant UI type (74.9%). This is higher than the prevalence rates reported in earlier studies conducted in Saudi Arabia, for example, in Jeddah, Riyadh, and the Asir region, which were 41.4%, 29.0%, and 47.5%, respectively (Al-Badr et al., 2012; Alshehri et al., 2022; Altaweel & Alharbi, 2012).

Table 1: Sociodemographic data of the participants ($n = 390$)

Parameters	Category	N	%
Age	60–69	339	86.9
	≥ 70	51	13.1
Marital status	Single	18	4.6
	Married	261	66.9
	Divorced	27	6.9
	Widowed	84	21.5
Parity	Null parity	45	11.5
	Parity (1–3)	63	16.2
	Parity (≥ 4)	282	72.3
Mode of delivery	Natural delivery	240	61.5
	Caesarean delivery	33	8.5
	Both vaginal and Caesarean	72	18.5
Family history of UI	No	240	61.5
	Mother or sister together	150	38.5
Living with family? *Missing 3 values	No	24	6.2
	Yes	363	93.8
Smoking habits	Non-smoker	375	96.1
	Current smoker	15	3.8
BMI	Underweight	6	1.5
	Normal weight	71	18.2
	Overweight	133	34.1
	Class I obesity	119	30.5
	Class II obesity	35	9.0
Class III obesity	26	6.7	

Table 2: Descriptive analysis showing medical history, medications, history of surgeries, and daily habits (n = 390)

Parameters	Category	N	%
Medical history	None	168	43.1
	Diabetes	150	38.5
	Spinal cord diseases	12	3.1
	Recurrent urinary tract infection	39	10.0
	Vitamin B12 deficiency	72	18.5
	Advanced prolapse of the pelvic organs	6	1.5
	Thrombus	12	3.1
	Normal pressure hydrocephalus	9	2.3
	External masses or tumors at the bladder outlet level	3	0.8
	Cognitive impairment	12	3.1
	Faecal incontinence	9	2.3
	Depression	12	3.1
	Vaginal atrophy	3	0.8
	Medications	I do not use any of these medicines	232
Analgesics		117	30.0
Hormone replacement therapy		9	2.3
Antihistamines		30	7.7
Diuretic medications		42	10.8
Heart medications (angiotensin-converting enzyme inhibitors)		36	9.2
Alpha 1 blockers		36	9.2
Antiarrhythmics		36	9.2
History of surgeries	Antidepressants	18	4.6
	No	348	89.2
	Genitourinary surgery (such as hysterectomy) or pelvic floor surgery	36	9.2
Pelvic radiation	No	12	3.1
	Yes	351	90.0
Poor functional status	No	39	10.0
	Yes	366	93.8
Participation in high-impact activities	No	24	6.2
	Yes	366	93.8
Consuming of artificial sweeteners daily?	No	216	55.4
	Yes	174	44.6

The cause of this disparity may be due to the different assessment methods used to report the prevalence. Furthermore, a significant majority of the participants in this study were older than 60 years, which corresponds to an increased probability of developing UI with old age. In contrast, previous studies included participants aged ≥ 20 years. Therefore, there is an association between the aging process and UI occurrence (Sohn et al., 2018). Postmenopausal women may experience the onset of UI,

Table 3: Association between sociodemographic data and urine leakage

Parameters	Category	UI		No UI		P-value
		N	%	N	%	
Age	60-69	204	60.2	135	39.8	0.025
	≥ 70	39	76.5	12	23.5	
Marital status	Married	162	62.1	99	37.9	< 0.001
	Divorced	15	55.6	12	44.4	
	Widowed	66	78.6	18	21.4	
Mode of delivery	Natural delivery	183	76.3	57	23.8	< 0.001
	Caesarean delivery	12	36.4	21	63.6	
	Both Natural and Caesarean	36	50.0	36	50.0	
Family history of UI	No	129	53.8	111	46.3	< 0.001
	Mother or sister together	114	76.0	36	24.0	
Parity	Null parity	12	26.7	33	73.3	< 0.001
	Parity (1-3)	37	58.7	26	41.3	
	Parity (≥ 4)	194	68.8	88	31.20	
BMI	Underweight	2	33.3	4	66.7	< 0.001
	Normal weight	32	45.1	39	54.9	
	Overweight	80	60.2	53	39.8	
	Class I obesity	83	69.7	36	30.3	
	Class II obesity	21	60.0	14	40.0	
	Class III obesity	25	96.2	1	3.8	

perhaps due to a decrease in estrogen levels. However, estrogen administration has not demonstrated efficacy in alleviating UI (Cody et al., 2012). Another study revealed that daily incontinence was more than twice as frequent in postmenopausal women as in premenopausal women, but only 26.1% of the postmenopausal women with incontinence sought medical advice on this issue. The results of the multivariate analysis revealed that menopause was the sole component that exhibited a statistically significant association with the occurrence of incontinence (Rekers et al., 1992; Russo et al., 2021; Trutnovsky et al., 2014).

In this study, UI exhibited a positive correlation with marital status, particularly parity and natural delivery. Several factors contribute to an increase in the risk of UI in women, including pregnancy, childbirth, and the number of children (Eason et al., 2004; Wesnes et al., 2009). UI risk rises in proportion to the number of children (Al-Badr et al., 2022; Kılıç, 2016), irrespective of the mode

of delivery (Cesarean or Natural). There is an increased likelihood that women who have UI during pregnancy will continue experiencing it thereafter (Wang et al., 2022). The probable rationale behind this phenomenon is

Table 4: Logistic regression showing the relationship between sociodemographic data and urine leakage

Parameters	Category	OR	95% CI		P value
			LB	UB	
Age	60–69	Ref.	Ref.	Ref.	Ref.
	≥70	1.70	0.73	3.95	0.219
Marital status	Widowed	Ref.	Ref.	Ref.	Ref.
	Married	0.53	0.25	1.10	0.098
	Divorced	0.72	0.27	2.16	0.549
Mode of delivery	None	Ref.	Ref.	Ref.	Ref.
	Natural delivery	5.23	1.50	19.3	0.011
	Caesarean delivery	0.81	0.18	3.63	0.781
	Both	1.63	0.42	6.57	0.480
Family history of UI	No	Ref.	Ref.	Ref.	Ref.
	Mother or sister	9.63	2.51	36.96	0.001
Parity	Null parity	Ref.	Ref.	Ref.	Ref.
	Parity (1–3)	3.91	1.71	8.97	0.001
	Parity (≥4)	6.06	3.00	12.30	< 0.001
BMI	Underweight	Ref.	Ref.	Ref.	Ref.
	Normal weight	0.08	0.01	1.29	0.075
	Overweight	0.16	0.01	2.42	0.186
	Class I obesity	0.25	0.02	3.86	0.323
	Class II obesity	0.22	0.01	3.58	0.285
	Class III obesity	5.52	0.20	154.6	0.315
History of Genitourinary surgery or pelvic floor surgery	NO	Ref.	Ref.	Ref.	Ref.
	Yes	4.77	1.54	21.2	0.016
Poor functional status	NO	Ref.	Ref.	Ref.	Ref.
	Yes	0.22	0.09	0.50	< 0.001
Smoking habits	No	Ref.	Ref.	Ref.	Ref.
	Yes	1.15	0.31	5.68	0.844
Recurrent urinary tract infections	No	Ref.	Ref.	Ref.	Ref.
	Yes	1.88	0.71	5.58	0.224
Taking anti-histamines	No	Ref.	Ref.	Ref.	Ref.
	Yes	3.04	1.07	10.1	0.051

that the application of repetitive force during delivery may result in the disruption of muscles, fascia, and ligaments, as well as injury to the connective and neurological structures of the pelvic organs and pelvic floor (Huebner et al., 2010; Tähtinen et al., 2019).

We identified BMI as a significant factor for UI risk. Epidemiological studies have demonstrated a noticeable

dose-response relationship between weight and UI, wherein each 5-unit rise in BMI was linked to a heightened risk of UI ranging from approximately 20% to 70% (Subak et al., 2009), possibly because of the presence of excessive abdominal obesity, which increases pressure on the bladder. The application of pressure on the pelvic floor and urethral tissues can compromise their integrity, hence increasing UI risk (Doumouchtsis et al., 2022; Richter et al., 2010).

We observed that women who had undergone pelvic surgery had a positive association with UI. A study was conducted in two major female stress UI surgical cohorts: the Stress Incontinence Surgical Treatment Efficacy Trial study (655 participants) and the subsequent Trial of Mid-Urethral Slings study (597 participants). The study found that regardless of the level of prolapse, individuals who have undergone previous surgery for pelvic organ prolapse have a higher prevalence of incontinence symptoms and report more distress associated with UI (Brubaker et al., 2010). Additionally, radiotherapy can weaken both the pelvic floor muscles and the urethral sphincter, perhaps resulting in incontinence (Bosch et al., 2020). Radiotherapy can also exert detrimental effects on the tissue and blood vessels in the epithelial lining of the bladder.

CONCLUSION

UI prevalence is high among older Saudi women in Makkah, Saudi Arabia. Physicians in primary care settings are recommended to actively screen for UI among older women, especially given that most women seem to avoid seeking medical help. This is important because the accessible therapy modalities for UI frequently provide sufficient alleviation of symptoms while decreasing patient discomfort.

AUTHOR CONTRIBUTION

NH and HA, both authors contributed equally to designing the study, data collection, data analysis, interpretation of results, and writing the manuscript.

ACKNOWLEDGEMENTS

The authors would like to thank all the study participants.

DECLARATIONS

Ethical Approval

This study protocol was approved by the Umm Al-Qura

University Institutional Research Board (IRB, HAPO-02-K-012-2023-04-1568) and also by the Ministry of Health IRB (H-02-K-076-0523-948).

Patients Consent

The patients were informed about the study. By agreeing to personal interviews, the participants implicitly and verbally expressed their agreement to participate in the study.

Source of Funding

Not Applicable.

Conflict of Interest

All authors have declared that no financial support was received from any organisation for the submitted work. All authors have declared that no other relationships or activities could appear to have influenced the submitted work.

OPEN ACCESS

This article is licensed under a Creative Commons Attribution-Non-Commercial 4.0 International License, which permits use, sharing, adaptation, distribution, and reproduction in any medium or format as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third-party material in this article are included in the article's Creative Commons license unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit <https://creativecommons.org/licenses/by-nc/4.0/>.

REFERENCES

Abrams, P., Andersson, K.-E., Bircder, L., Brubaker, L., Cardozo, L., Chapple, C., Cottenden, A., Davila, W., De Ridder, D., & Dmochowski, R. (2010). Fourth International Consultation on Incontinence Recommendations of the International Scientific Committee: Evaluation and treatment of urinary incontinence, pelvic organ prolapse, and fecal incontinence. *Neurourology and Urodynamics: Official Journal of the International Continence Society*, 29(1), 213-240. <https://doi.org/10.1002/nau.20870>

Abufaraj, M., Xu, T., Cao, C., Siyam, A., Isleem, U., Massad, A., Soria, F., Shariat, S. F., Sutcliffe, S., & Yang, L. (2021). Prevalence and trends in urinary incontinence among women in the United States, 2005-2018. *American Journal of Obstetrics and Gynecology*, 225(2), 166.e1-166.e12. <https://doi.org/10.1016/j.ajog.2021.03.016>

Al-Badr, A., Brasha, H., Al-Raddadi, R., Noorwali, F., & Ross, S. (2012). Prevalence of urinary incontinence among Saudi women. *International Journal of Gynecology & Obstetrics*, 117(2), 160-163. <https://doi.org/10.1016/j.ijgo.2011.12.014>

Al-Badr, A., Saleem, Z., Kaddour, O., Almosaieed, B., Dawood, A., Al-Tannir, M., AlTurki, F., Alharbi, R., & Alsanca, N. (2022). Prevalence of pelvic floor dysfunction: A Saudi national survey. *BMC Women's Health*, 22(1), 27. <https://doi.org/10.1186/s12905-022-01609-0>

AlAzab, R., Alomari, R. A., Khader, Y. S., & Gharaibeh, M. (2021). Stress urinary incontinence among Jordanian women living in rural areas: Prevalence, associated factors and self-management behaviours. *Arab Journal of Urology*, 19(4), 469-472. <https://doi.org/10.1080/2090598X.2021.1926751>

Almutairi, S., Alobaid, O., Al-Zahrani, M., Alkhamees, M., Aljuhayman, A., & Ghazwani, Y. (2021). Urinary incontinence among Saudi women: Prevalence, risk factors, and impact on quality of life. *European Review for Medical and Pharmacological Sciences*, 25(20), 6311-6318. https://doi.org/10.26355/eurev_202110_27001

Alshammari, S., Alyahya, M. A., Allhidan, R. S., Assiry, G. A., AlMuzini, H. R., & AlSalman, M. A. (2020). Effect of urinary incontinence on the quality of life of older adults in Riyadh: Medical and sociocultural perspectives. *Cureus*, 12(11). <https://doi.org/10.7759/cureus.11599>

Alshehri, S. Z., Abumilha, A. K., Amer, K. A., Aldosari, A. A., Shawkhan, R. A., Alasmari, K. A., Sabrah, T. A., Alshehri, S., Abumilha, A., & Sabrah Sr, T. (2022). Patterns of urinary incontinence among women in Asir Region, Saudi Arabia. *Cureus*, 14(1). <https://doi.org/10.7759/cureus.21628>

Altaweel, W., & Alharbi, M. (2012). Urinary incontinence: Prevalence, risk factors, and impact on health related quality of life in Saudi women. *Neurourology and Urodynamics*, 31(5), 642-645. <https://doi.org/10.1002/nau.22201>

Aly, W. W., Sweed, H. S., Mossad, N. A., & Tolba, M. F. (2020). Prevalence and risk factors of urinary incontinence in frail elderly females. *Journal of Aging Research*, 2020. <https://doi.org/10.1155/2020/2425945>

Aniuliene, R., Aniulis, P., & Steibliene, V. (2016). Risk factors and types of urinary incontinence among middle-aged and older male and female primary care patients in Kaunas region of Lithuania: Cross sectional study. *Urology Journal*, 13(1), 2552. <https://doi.org/10.22037/uj.v13i1.3094>

Aoki, Y., Brown, H. W., Brubaker, L., Cornu, J. N., Daly, J. O., & Cartwright, R. (2017). Urinary incontinence in women. *Nature Reviews Disease Primers*, 3(1), 1-20. <https://doi.org/10.1038/nrdp.2017.42>

Bosch, R., McCloskey, K., Bahl, A., Arlandis, S., Ockrim, J., Weiss, J., & Greenwell, T. (2020). Can radiation-induced lower urinary tract disease be ameliorated in patients treated for pelvic organ cancer: ICI-RS 2019? *Neurourology and Urodynamics*, 39(S148-S155). <https://doi.org/10.1002/nau.24380>

Brown, J. S., Bradley, C. S., Subak, L. L., Richter, H. E., Kraus, S. R., Brubaker, L., Lin, F., Vittinghoff, E., Grady, D., &

- Group, D. A. o. I. S. R. (2006). The sensitivity and specificity of a simple test to distinguish between urge and stress urinary incontinence. *Annals of Internal Medicine*, 144(10), 715-723. <https://doi.org/10.7326/0003-4819-144-10-200605160-00005>
- Brubaker, L., Rickey, L., Xu, Y., Markland, A., Lemack, G., Ghetti, C., Kahn, M. A., Nagaraju, P., Norton, P., & Chang, T. D. (2010). Symptoms of combined prolapse and urinary incontinence in large surgical cohorts. *Obstetrics & Gynecology*, 115(2 Part 1), 310-316. <https://doi.org/10.1097/aog.0b013e3181cb86b2>
- Cody, J. D., Jacobs, M. L., Richardson, K., Moehrer, B., & Hextall, A. (2012). Oestrogen therapy for urinary incontinence in post-menopausal women. *Cochrane Database of Systematic Reviews*, (10). <https://doi.org/10.1002/14651858.cd001405.pub3>
- Daugirdas, S. P., Markossian, T., Mueller, E. R., Durazo-Arvizu, R., Cao, G., & Kramer, H. (2020). Urinary incontinence and chronic conditions in the US population age 50 years and older. *International Urogynecology Journal*, 31, 1013-1020. <https://doi.org/10.1007/s00192-019-04137-y>
- Doumouchtsis, S., Loganathan, J., & Pergialiotis, V. (2022). The role of obesity on urinary incontinence and anal incontinence in women: A review. *BJOG: An International Journal of Obstetrics & Gynaecology*, 129(1), 162-170. <https://doi.org/10.1111/1471-0528.16848>
- Eason, E., Labrecque, M., Marcoux, S., & Mondor, M. (2004). Effects of carrying a pregnancy and of method of delivery on urinary incontinence: A prospective cohort study. *BMC Pregnancy and Childbirth*, 4(1), 1-6. <https://doi.org/10.1186/1471-2393-4-4>
- Elstad, E. A., Taubenberger, S. P., Botelho, E. M., & Tennstedt, S. L. (2010). Beyond incontinence: The stigma of other urinary symptoms. *Journal of Advanced Nursing*, 66(11), 2460-2470. <https://doi.org/10.1111/j.1365-2648.2010.05422.x>
- Griehling, T. L. (2009). Urinary incontinence in the elderly. *Clinics in Geriatric Medicine*, 25(3), 445-457. <https://doi.org/10.1016/j.cger.2009.06.004>
- Haylen, B. T., De Ridder, D., Freeman, R. M., Swift, S. E., Berghmans, B., Lee, J., Monga, A., Petri, E., Rizk, D. E., & Sand, P. K. (2010). An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. *Neurourology and Urodynamics*, 29(1), 4-20. <https://doi.org/10.1007/s00192-009-0976-9>
- Haylen, B. T., Krishnan, S., Schulz, S., Verity, L., Law, M., Zhou, J., & Sutherst, J. (2007). Has the true prevalence of voiding difficulty in urogynecology patients been underestimated? *International Urogynecology Journal*, 18, 53-56. <https://doi.org/10.1007/s00192-006-0094-x>
- Horrocks, S., Somerset, M., Stoddart, H., & Peters, T. J. (2004). What prevents older people from seeking treatment for urinary incontinence? A qualitative exploration of barriers to the use of community continence services. *Family Practice*, 21(6), 689-696. <https://doi.org/10.1093/fampra/cmh622>
- Huebner, M., Antolic, A., & Tunn, R. (2010). The impact of pregnancy and vaginal delivery on urinary incontinence. *International Journal of Gynecology & Obstetrics*, 110(3), 249-251. <https://doi.org/10.1016/j.ijgo.2010.04.019>
- Kılıç, M. (2016). Incidence and risk factors of urinary incontinence in women visiting Family Health Centers. *SpringerPlus*, 5(1), 1-9. <https://doi.org/10.1186/s40064-016-2965-z>
- Lukacz, E. S., Santiago-Lastra, Y., Albo, M. E., & Brubaker, L. (2017). Urinary incontinence in women: A review. *JAMA*, 318(16), 1592-1604. <https://doi.org/10.1001/jama.2017.12137>
- Mazloomdoost, D., Westermann, L. B., Crisp, C. C., Oakley, S. H., Kleeman, S. D., & Pauls, R. N. (2017). Primary care providers' attitudes, knowledge, and practice patterns regarding pelvic floor disorders. *International Urogynecology Journal*, 28, 447-453. <https://doi.org/10.1007/s00192-016-3134-1>
- Minassian, V. A., Bazi, T., & Stewart, W. F. (2017). Clinical epidemiological insights into urinary incontinence. *International Urogynecology Journal*, 28, 687-696. <https://doi.org/10.1007/s00192-017-3314-7>
- Nightingale, G. (2020). Management of urinary incontinence. *Post Reproductive Health*, 26(2), 63-70. <https://doi.org/10.1177/2053369120927112>
- Norton, P., & Brubaker, L. (2006). Urinary incontinence in women. *The Lancet*, 367(9504), 57-67. [https://doi.org/10.1016/s0140-6736\(06\)67925-7](https://doi.org/10.1016/s0140-6736(06)67925-7)
- Rekers, H., Drogendijk, A., Valkenburg, H., & Riphagen, F. (1992). The menopause, urinary incontinence and other symptoms of the genito-urinary tract. *Maturitas*, 15(2), 101-111. [https://doi.org/10.1016/0378-5122\(92\)90244-X](https://doi.org/10.1016/0378-5122(92)90244-X)
- Richter, H. E., Kenton, K., Huang, L., Nygaard, I., Kraus, S., Whitcomb, E., Chai, T. C., Lemack, G., Sirls, L., & Dandreo, K. J. (2010). The impact of obesity on urinary incontinence symptoms, severity, urodynamic characteristics and quality of life. *The Journal of Urology*, 183(2), 622-628. <https://doi.org/10.1016/j.juro.2009.09.083>
- Russo, E., Caretto, M., Giannini, A., Bitzer, J., Cano, A., Ceausu, I., Chedraui, P., Durmusoglu, F., Erkkola, R., & Goulis, D. G. (2021). Management of urinary incontinence in postmenopausal women: An EMAS clinical guide. *Maturitas*, 143, 223-230. <https://doi.org/10.1016/j.maturitas.2020.09.005>
- Scime, N. V., Hetherington, E., Metcalfe, A., Chaput, K. H., Dumanski, S. M., Seow, C. H., & Brennand, E. A. (2022). Association between chronic conditions and urinary incontinence in females: A cross-sectional study using national survey data. *Canadian Medical Association Open Access Journal*, 10(2), E296-E303. <https://doi.org/10.9778/cmajo.20210147>
- Sohn, K., Lee, C. K., Shin, J., & Lee, J. (2018). Association between female urinary incontinence and geriatric health problems: Results from Korean longitudinal study of ageing (2006). *Korean Journal of Family Medicine*, 39(1), 10. <https://doi.org/10.4082/kjfm.2018.39.1.10>

- Subak, L. L., Richter, H. E., & Hunskaar, S. (2009). Obesity and urinary incontinence: Epidemiology and clinical research update. *The Journal of Urology*, 182(6), S2-S7. <https://doi.org/10.1016/j.juro.2009.08.071>
- Tähtinen, R. M., Cartwright, R., Vernooij, R. W., Rortveit, G., Hunskaar, S., Guyatt, G. H., & Tikkinen, K. A. (2019). Long-term risks of stress and urgency urinary incontinence after different vaginal delivery modes. *American Journal of Obstetrics and Gynecology*, 220(2), 181.e181-181.e188. <https://doi.org/10.1016/j.ajog.2018.10.034>
- Thabet, A., Battecha, K., Alayat, M., Ali, M., Mahmoud, H., Ebid, A., Abd El-Kafy, E., Ibrahim, A., El-Sayed, M., & Alzahrani, A. (2023). Prevalence of urinary incontinence among women in Saudi Arabia: A cross-sectional study. *European Review for Medical and Pharmacological Sciences*, 27(13). https://doi.org/10.26355/eurrev_202307_32958
- Trutnovsky, G., Rojas, R. G., Mann, K. P., & Dietz, H. P. (2014). Urinary incontinence: The role of menopause. *Menopause*, 21(4), 399-402. <https://doi.org/10.1097/gme.0b013e31829fc68c>
- Vethanayagam, N., Orrell, A., Dahlberg, L., McKee, K. J., Orme, S., Parker, S. G., & Gilhooly, M. (2017). Understanding help-seeking in older people with urinary incontinence: An interview study. *Health & Social Care in the Community*, 25(3), 1061-1069. <https://doi.org/10.1111/hsc.12406>
- Wang, X., Jin, Y., Xu, P., & Feng, S. (2022). Urinary incontinence in pregnant women and its impact on health-related quality of life. *Health and Quality of Life Outcomes*, 20(1), 1-8. <https://doi.org/10.1186/s12955-022-01920-2>
- Wesnes, S. L., Hunskaar, S., Bo, K., & Rortveit, G. (2009). The effect of urinary incontinence status during pregnancy and delivery mode on incontinence postpartum: A cohort study. *BJOG: An International Journal of Obstetrics & Gynaecology*, 116(5), 700-707. <https://doi.org/10.1111/j.1471-0528.2008.02107.x>
- Yan, F., Xiao, L. D., Zhou, K., Li, Z., & Tang, S. (2022). Perceptions and help-seeking behaviours among community-dwelling older people with urinary incontinence: A systematic integrative review. *Journal of Advanced Nursing*, 78(6), 1574-1587. <https://doi.org/10.1111/jan.15183>