Prevalence, and Associated Risk Factors of Urinary Incontinence in an Omani Geriatric Population, Muscat, Oman: A Cross-Sectional Study

Rahma Al Hadhrami[1*], Amira Mohammed Al Belushi[2], Juhaina Ahmed Al Mamari[2] and Badriya Fadhil Al-Mahrouqi[3]

[1]*University Medical City, Sultan Qaboos University Hospital, Department of Family Medicine and Public Health, Muscat, Oman*
[2]*Oman Medical Specialty Board, Muscat, Oman*
[3]*Ministry of Health, Family Medicine, Muscat, Oman*

Abstract

Background: Urinary incontinence (UI) is common among older adults, with risk influenced by chronic illnesses and physiological changes, particularly in women. Despite incontinence screening being part of Oman's elderly care program, data on UI prevalence and predictors in the geriatric population remain limited.

Objectives: This study aimed to identify the prevalence, and associated risk factors of urinary incontinence (UI) among elderly Omani patients.

Methods: This cross-sectional study, conducted at four health centers in Bausher Wilayat, Muscat, Oman, from January 2018 to December 2019, targeted Omani patients aged 60 years and above enrolled in geriatric programs. Of 378 eligible patients, 323 participated (response rate: 85.4%). Incontinence screening was conducted by local guidelines, and multivariate logistic regression analysis identified risk factors associated with UI, reported as odds ratios (ORs) with 95% confidence intervals (CIs).

Results: The prevalence of UI was 37.2% (95% CI: 31.9-42.7%). Significant risk factors included diabetes mellitus, obesity, recurrent UTIs, multiparity, prostate disease, cognitive impairment, stroke, and previous genitourinary or spinal surgery (P<0.050). Multivariate analysis identified obesity (OR=5.440, 95% CI=3.161-9.361; p<0.001) and recurrent UTIs (OR=5.217, 95% CI=1.631-16.684; p=0.005) as the only independent predictors.

Conclusion: The prevalence of UI in an Omani geriatric population was high. Healthcare professionals should consider implementing routine screening for UI in elderly Omani patients, particularly among those at increased risk for this disorder, such as obese patients and patients with a history of recurrent UTIs.

Keywords: *Urinary incontinence, geriatrics, prevalence, risk factors, Oman.*

INTRODUCTION

Urinary incontinence (UI), defined as the unintentional flow of urine at inappropriate times, is a common condition in individuals aged ≥60 years [1, 2]. It manifests in various forms, including stress incontinence, where leakage occurs during effort or physical activity due to insufficient urethral sphincter action; urge incontinence, characterized by a sudden, intense need to urinate; mixed incontinence, combining stress and urge incontinence; overflow incontinence, caused by incomplete bladder emptying; and transient incontinence, triggered by temporary factors such as infections or medications [1-3].

UI prevalence in the general population ranges from 5-70%, with most studies reporting rates between 25-45% and annual incidence rates of 1-9% [4, 5]. Women are approximately twice as likely to experience UI due to physiological, physical, and hormonal changes, such as those associated with pregnancy, childbirth, and menopause [6]. Although aging does not directly cause UI, age-related risk factors such as diabetes mellitus (DM), neurological disorders, prostate cancer, chronic obstructive pulmonary disease (COPD), and arthritis increase their likelihood [7, 8]. Among older women, factors like parity, high body mass index (BMI), menopause, recurrent urinary tract infections (UTIs), and prior surgeries have been associated with increased UI risk [9]. Environmental factors, such as unsafe bathrooms and inadequate toileting assistance, also contribute [10]. A study in Saudi Arabia reported the highest UI prevalence among individuals aged ≥50 years and noted significant associations with age and marital status (p <0.001) [11].

If untreated, UI can lead to serious consequences, including hydronephrosis, kidney damage, sepsis, decubitus ulcers, and recurrent UTIs [1, 2, 12]. Additionally, UI adversely affects the physical, psychological, social, and sexual health of patients, significantly diminishing quality of life (QOL) [1]. For Muslim patients, UI poses unique challenges, as cleanliness is crucial for prayer, adding emotional and social distress [13]. In Saudi Arabia, UI negatively impacted social lives (36.3%), physical activity (18.5%), personal hygiene (21.8%), self-esteem (32.3%), and religious practices, with 33.1% repeating prayers due to incontinence [14]. A Qatari study highlighted how cultural and religious factors significantly influenced the QOL of 21% of women with

Corresponding author: Rahma Al Hadhrami, University Medical City, Sultan Qaboos University Hospital, Department of Family Medicine and Public Health, Muscat, Oman, Email: rahmasaid@squ.edu.om
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UI, with bronchial asthma identified as a major risk factor [15].

The prevalence and impact of UI vary globally. For instance, in Iran, 24.9% of older adults were affected, with stress incontinence accounting for 40.2% of cases, significantly influencing QOL [16]. Similarly, Malaysian studies reported a prevalence of 16% among urban and 23% among rural older women [17].

In Oman, a comprehensive elderly care program launched in 2011 addresses the preventive and curative needs of older adults, aiming to enhance their health and well-being. This program, implemented in collaboration with the Ministry of Health and the Ministry of Social Development, includes incontinence screening as part of elderly care assessments. By the end of 2018, 68,680 elderly individuals (44.8% of the total elderly population) were enrolled in the program. The elderly population, comprising those aged ≥60 years, constitutes 6% of Oman's population [18]. Despite these efforts, data on UI prevalence and its predictors among the elderly in Oman remain limited. Existing studies have primarily focused on women and excluded men or the geriatric population [13, 19, 20].

This study aimed to estimate the prevalence of UI and identify its risk factors among a cohort of geriatric Omani patients.

METHODS

This cross-sectional study was carried out between January 2018 and December 2019 at four local health centers in Bausher wilayat, Muscat, Oman. Of the six health centers in the wilayat, only the North Al-Khuwair, Al-Ghubrah, Al-Athaiba, and Al-Ansab health centers were included. The other two centers were excluded because one was not yet open at the beginning of the study period and the other lacked a register for elderly patients. Wilayat Bausher is one of the most densely populated regions in Oman, where the elderly program was established in its health centers from the beginning as a clinic run regularly one to two times per month. The target population consisted of all Omani patients aged ≥60 years who visited the geriatric clinics of the selected centers during the study period. The necessary sample size for the study was calculated by the statistician to be 323 based on a 95% confidence interval (CI), an expected prevalence of 30%, and an absolute precision of 5% using Raosoft sample size calculator (http: //www.raosoft.com/samplesize.html).

In Oman, the Directorate General of Primary Health Care at the Ministry of Health introduced the elderly care program in 2011 across all governorates. This initiative specifically targets individuals aged 60 and above, offering both preventive and curative services to address their health needs. The program is implemented in all primary healthcare centers throughout the Sultanate. Elderly Omani patients were identified from the elderly

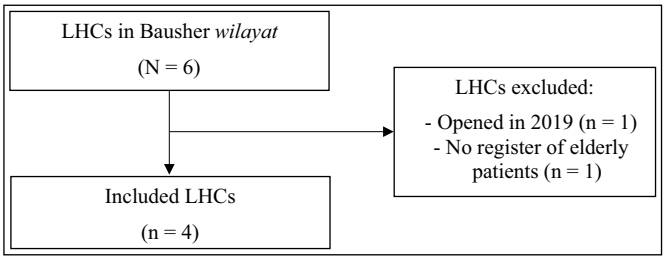

Fig. (1A): LHCs-local health centres selections.

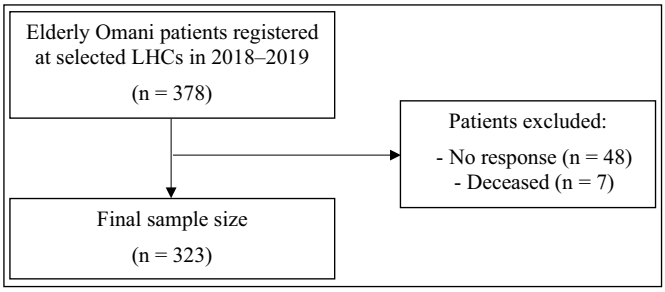

Fig. (1B): Flow chart demonstrating the selection of the study population.

registers of the selected clinics using their medical record numbers. Relevant data for each patient were gathered from their electronic medical records using the Alshifa Hospital Information Systems software (Ministry of Health, Muscat, Oman). Registered patients or their primary caregivers were contacted *via* telephone to obtain their consent for participation in the study and to clarify any incomplete or missing data. Two attempts were made to contact each patient between 8:30 am and 12:30 pm from the health centre's direct telephone line. Of the 378 patients registered in the 2018-2019 geriatric registers of the selected health centers, 48 could not be reached by telephone due to incorrect contact details, being out of range, or not answering during the two contact attempts, and seven were deceased (**Fig. 1A, 1B**).

The presence of urinary incontinence (UI) was determined based on published local guidelines from the Ministry of Health. As part of the elderly care assessment, incontinence screening is performed by calculating a total risk score based on responses to a series of six questions. A score of 1 is assigned for the presence of each risk factor and a score of 0 for their absence. A total score greater than 0 is considered indicative of potential urinary incontinence (UI), requiring further follow-up [18].

This study was granted ethical approval by the regional research committee at the Directorate General of Health Services in Muscat (Reference: MH/DGHS/DPT/149/2021). Informed verbal consent was obtained from all patients and/or their caregivers over the telephone after introducing the research team and outlining the study's objectives. All personal and confidential data were recorded on paper and preserved in a sealed envelope. Electronic data were saved on a personal laptop and password-protected to ensure patient confidentiality and privacy.

A total of 378 patients registered in the 2018-2019 geriatric registers or their primary caregivers were phoned to secure their agreement to partake in the study and to address any incomplete or missing information. Two efforts were made to reach each patient between 8:30 am and 12:30 pm using the health centre's direct phone line.

Collected data were analyzed using the Statistical Software for the Social Sciences (SPSS), version 23 (IBM Corp., Armonk, New York, USA). Descriptive statistics were used to present the data. Continuous data were provided as means and standard deviations, while categorical variables were shown as frequencies and percentages. Relationships between independent factors and outcome variables were determined by using Chi-square tests. Independent factors associated with UI were initially identified through univariate analysis, followed by multivariable binary logistic regression for variables with a p-value <0.25 in the univariate analysis. A two-tailed significance threshold of p ≤0.050 was applied.

RESULTS

A total of 323 patients participated in the study (response rate: 85.4%). Overall, 206 (63.8%) were female and 117 (36.2%) were male. Of the women, 150 (72.8%) were multiparous, making up 46.4% of the total population. Just under half of the cohort had DM (45.8%) and 39% were obese. Other UI risk factors included chronic lung illness, recurrent UTIs, prostate disease, stroke, cognitive impairment, and a prior history of spinal or genitourinary surgery. The majority of the cohort (88.9%) had three or fewer UI risk factors (**Table 1**).

Table 1: Prevalence of urinary incontinence-related risk factors among geriatric Omani patients in Bausher wilayat, Muscat, Oman (N = 323).

Variable	Frequency (%)
Gender	
Male	117 (36.2)
Female	206 (63.8)
UI risk factors*	
DM	148 (45.8)
COPD	27 (8.4)
Obesity	126 (39)
Recurrent UTIs	21 (6.5)
Multiparity	150 (46.4)
Prostate disease	20 (6.2)
Cognitive impairment	8 (2.5)
Stroke	11 (3.4)
Genitourinary surgery	47 (14.6)
Spinal surgery	18 (5.6)
Number of risk factors	
0-3	287 (88.9)
>3	36 (11.1)

DM = diabetes mellitus; COPD = chronic obstructive pulmonary disease; UTIs = urinary tract infections. *Percentages do not add up to 100% because some patients had more than one risk factor.

Table 2: Associations between risk factors and urinary incontinence among geriatric Omani patients in Bausher wilayat, Muscat, Oman (N = 323).

Variable	n (%)		p-value
	Without UI	With UI	
Gender			
Male	74 (36.5)	43 (35.8)	1.000
Female	129 (63.5)	77 (64.2)	
UI risk factors*			
DM	78 (38.4)	70 (58.3)	<0.001†
COPD	13 (6.4)	14 (11.7)	0.144
Obesity	48 (23.6)	78 (65)	<0.001†
Recurrent UTIs	5 (2.5)	16 (13.3)	<0.001†
Multiparity	82 (40.4)	68 (56.7)	0.006†
Prostate disease	8 (3.9)	12 (10)	0.034†
Cognitive impairment	1 (0.5)	7 (5.8)	0.005†
Stroke	1 (0.5)	10 (8.3)	<0.001†
Genitourinary surgery	23 (11.3)	24 (20)	0.049†
Spinal surgery	5 (2.5)	13 (10.8)	0.002†

UI = urinary incontinence; DM = diabetes mellitus; COPD = chronic obstructive pulmonary disease; UTIs = urinary tract infections. * Percentages do not add up to 100% because some patients had more than one risk factor. †Statistically significant at P <0.050.

Table 3: Independent predictors of urinary incontinence among geriatric Omani patients in Bausher wilayat, Muscat, Oman (N = 323).

Factor	OR (95%CI)	p-value	aOR (95%CI)	p-value
DM	2.24 (1.416-3.554)	0.001	1.556 (0.901-2.686)	0.113
COPD	7.930 (0.875-4.259)	0.103	1.474 (0.589-3.686)	0.407
Obesity	5.997 (3.654-9.843)	<0.001	5.440 (3.161-9.361)	<0.001*
Recurrent UTIs	6.092 (2.171-17.097)	0.001	5.217 (1.631-16.684)	0.005*
Multiparity	1.930 (1.222-3.048)	0.005	1.513 (0.848-2.697)	0.161
Prostate disease	2.708 (1.074-6830)	0.035	2.731 (0.863-8.645)	0.087
Cognitive impairment	12.513 (1.520-102.996)	0.019	5.434 (0.409-72.165)	0.200
Stroke	18.364 (2.320-145.340)	0.006	8.972 (0.899-89.574)	0.062
Genitourinary surgery	1.957 (1.049-3.649)	0.035	1.117 (0.515-2.425)	0.779
Spinal surgery	4.811 (1.670-13.857)	0.004	2.283 (0.630-8.267)	0.209

OR = odds ratio; CI = confidence interval; DM = diabetes mellitus; COPD = chronic obstructive pulmonary disease; UTIs = urinary tract infections. *Statistically significant at P <0.050.

Based on a total UI r isk score of >0 using local Ministry of Health screening guidelines, the prevalence of UI in the population was 37.2% (95% confidence interval [CI]: 31.9-42.7%). The difference in UI prevalence between men and women was not statistically significant. Apart from chronic pulmonary illness, statistically significant associations were observed between UI and every other risk factor (P <0.05 each) (**Table 2**). However, upon further multivariate analysis, only obesity and recurrent UTIs remained statistically significant independent predictors of UI (P = 0.001 and 0.005, respectively). Patients who were obese had a five-fold higher likelihood

of UI compared to those who were not (odds ratio [OR] = 5.440, 95% CI = 3.161-9.361). Similarly, those with recurrent UTIs also had a five-fold increased risk of UI compared to those without recurrent UTIs (OR = 5.217, 95% CI = 1.631-16.684) (**Table 3**).

DISCUSSION

This study revealed the prevalence of UI in an Omani geriatric population to be relatively high (37.2%) based on a total UI risk score of >0 using local Ministry of Health screening guidelines. Other studies have reported similar rates of UI in different populations. For instance, one study observed UI in up to 35% of hospitalized patients aged ≥65 years during their hospital stay [8]. Another study indicated that 34.5% of Omani women aged 20-50 years reported being affected by UI [19]. Surprisingly, a national population-based sample of 800 women was interviewed and found the prevalence of UI was 42.9%, and only 23.3% sought medical care [6]. In the Gulf area, a systematic review showed the prevalence of UI ranged from 20.3% to 54.5% [20]. According to various reviews of the literature, the frequency of UI among women in Turkey ranges from 16.4-54.5% [21, 22]. Aly *et al.* reported an extremely high UI prevalence (80%) in a female population aged >60 years living in Cairo, Egypt [1]. Determining the true prevalence of urinary incontinence (UI) is challenging due to societal and cultural influences. Many older adults consider UI a normal aspect of aging and may feel embarrassed to discuss it, leading to underreporting [19, 23]. The frequency of UI can vary significantly depending on the research methods used, the racial or cultural backgrounds of the study populations, or specific regional risk factors. Various tools and questionnaires are used to determine the prevalence of urinary incontinence, such as the International Consultation on Incontinence Questionnaire (ICIQ), which assesses the impact and symptoms of UI on daily life. Additionally, the Urogenital Distress Inventory (UDI-6) is often employed to evaluate the severity of urinary symptoms and their effect on women's quality of life. The present study relies on a screening tool based on local guidelines, which may contribute to the variability in urinary incontinence (UI) prevalence. Moreover, differences in population demographics such as age and gender, along with variations in sampling methods, can explain the disparities in prevalence rates observed across different studies [4].

Obesity and recurrent UTIs were identified as significant independent predictors of UI in the current study. In particular, obesity was found to increase the incidence of UI among geriatric Omani patients by fivefold (OR = 5.440, 95% CI = 3.161-9.361; P <0.001). This finding is in line with several studies from various regions of the world, including the Gulf, Turkey, and Italy; thus, despite differences in the gender and age of the population under study, the existing literature consistently indicates that obesity, as measured by BMI, is one of the main risk factors for UI [9, 20, 24-27]. In particular, a review of the literature revealed that the risk of UI increases by 20-70% for every increase of five BMI units, with trials showing that both surgical and nonsurgical weight loss significantly reduced UI symptoms [28].

In addition, the present study found that the risk of UI was five times greater for Omani geriatric patients with recurrent UTIs (OR = 5.217, 95% CI = 1.631-16.684; P = 0.005). Previous cross-sectional studies performed in Turkey and Italy have similarly reported that recurrent UTIs increase the risk of UI (OR = 4.73, 95% CI = 2.52-8.88), although the latter study found this association to be more marked for men than women [22, 24]. Concerning other risk factors, the current study demonstrated associations between UI and various factors, including DM, multiparity, prostate disease, cognitive impairment, stroke, and genitourinary or spinal surgery. In Northeast Brazil, Jerez-Roig *et al.* observed statistically significant correlations between UI and various risk factors among nursing home residents, including ethnicity, physical inactivity, stroke, mobility impairment, and cognitive decline [28].

This study emphasizes the importance of early screening in order to prevent and mitigate the impact of UI among elderly Omani patients. In particular, healthcare professionals should have a high index of suspicion for this condition and routinely examine senior patients for symptoms or risk factors suggestive of UI, such as those who are obese or have a history of recurrent UTIs. For the latter, there is a need for further investigation to determine the reasons behind the recurrent infections and, if necessary, to prescribe appropriate treatment. Healthcare providers should also encourage obese patients to lose weight by maintaining a balanced diet and sufficient exercise. Even though there is little research demonstrating how such interventions might lower the incidence, prevalence, or severity of UI, other risk factors for UI can also be controlled by managing DM and encouraging birth spacing [4]. Finally, complete documentation of geriatric screening procedures, including for UI symptoms, is required in order to prevent over-interviewing the patient and causing them unnecessary embarrassment, as well as to ensure appropriate follow-up for any subsequent intervention and management strategies implemented.

The fundamental goal of UI therapies is to increase continence by reducing the frequency of UI episodes [29]. Unfortunately, many elderly patients refuse to seek treatment for UI as a result of a confluence of psychological and logistical limitations [30]. In Oman, only 23.3% of those affected sought medical attention, even though 65% of those affected said their condition concerned them [6]. Elderly patients may be discouraged from seeking counsel due to shame or embarrassment; in addition, there may be generational disparities regarding the sharing of such 'private' information [30]. Older individuals may be more inclined to disclose UI

symptoms and seek medical counsel if primary care providers expressly inquire about urine leaks.

Various strategies can be used to mitigate the impact of UI on affected patients. Lifestyle adjustments such as a balanced diet, Kegel exercises, and weight loss can provide symptom relief [9]. Examples of other, non-pharmacological treatments include pelvic floor muscle training (PFMT), bladder training, habit retraining, and timed or prompted voiding [2]. A recent randomized, controlled, single-blind study found that home-based PFMT was successful in reducing symptoms of stress UI and enhancing the QOL of adult Omani women affected by UI [19]. Another prospective case series found that the weekly mean frequency of UI episodes decreased significantly among a cohort of senior outpatients who underwent behavioral treatment involving biofeedback, PFMT, and timed urination with an average improvement rate of 81.6% (range: 30.8-100%) [29].

STRENGTHS AND LIMITATIONS OF THIS STUDY

The study followed local guidelines for incontinence screening, ensuring a standardized and population-relevant process. With an 85.4% response rate, data were collected from a substantial portion of the target population, enhancing the reliability and generalizability of findings. Multivariate binary logistic regression was used to identify independent predictors of urinary incontinence, accounting for confounding variables and providing precise insights. However, some risk factors showed no significant correlation, potentially reflecting limitations due to the study's sample size. The cross-sectional design limited the ability to establish causality, identifying associations rather than cause-and-effect relationships. Additionally, self-reported data may have introduced reporting bias, impacting accuracy, and other potential confounding factors were not examined.

CONCLUSION

Based on the results of this study, UI is a relatively common condition among a cohort of geriatric Omani individuals. Healthcare professionals should therefore conduct routine screening for symptoms or risk factors suggestive of UI in elderly patients, such as obesity and recurrent UTIs, both of which were found to be significant independent predictors of UI in this population.

ETHICS APPROVAL

This study was granted ethical approval by the regional research committee at the Directorate General of Health Services in Muscat (Reference: MH/DGHS/DPT/149/2021). All procedures performed in studies involving human participants followed the ethical standards of the institutional and/ or national research committee and the Helsinki Declaration.

CONSENT FOR PUBLICATION

Informed verbal consent was obtained from all patients and/or their caregivers over the telephone after introducing the research team and outlining the study's objectives.

AVAILABILITY OF DATA

The data is available upon request from the editors.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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AUTHORS' CONTRIBUTION

R.H.: Consultant, Family Medicine, Department of Family Medicine and Public Health, Sultan Qaboos University Hospital, Muscat, Oman: Study design, definition of intellectual content, review writing proposal, review statistical analysis, manuscript preparation, manuscript editing and review, project administration and supervision. In addition, she is responsible for the integrity of the work as a whole from inception to the published article 'Guarantor'.

A.B. and J.M.: Family Medicine Program, Oman Medical Specialty Board, Muscat, Oman: literature search, writing proposal, data collection, statistical analysis, manuscript preparation, and manuscript editing.

B.M.: Study design, definition of intellectual content, review writing proposal, co-supervisor of the research.

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