Factors Associated With Urgency Urinary Incontinence Among Older Mexican American Women Aged 65 years and Older

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Abstract

The purpose of this study was to determine which socio-demographic, clinical, or functional factors are associated with urgency urinary incontinence (UUI) over 20-years of follow-up in a community-dwelling sample of Mexican American women aged 65 years and older without UUI at baseline. We included 1,358 women participants from the Hispanic Established Population for the Epidemiologic Study of the Elderly study conducted in the southwestern of US (Arizona, California, Colorado, New Mexico, and Texas). Measures included self-reported UUI, socio-demographics, smoking status, body mass index, medical conditions, depressive symptoms, physical and cognitive function, and handgrip strength. We used generalized estimating equation models to estimate the odds ratio (OR) and 95% Confidence Interval (CI) of UUI as a function of socioeconomic, clinical, and functional factors. Self-reported UUI increased from 3.1% to 21.9% from baseline (1993/1994) to follow-up (2012/2013). Current smokers, obesity, arthritis, previous heart attacks, and depressive symptoms were factors associated with greater odds of UUI over time. Identification of these factors can help clinicians determine those at high risk of developing UUI. Preventing and/or treating the risk factors early may delay UUI and increase quality of life in this underserved population.

Introduction

Urgency urinary incontinence (UUI), a geriatric syndrome defined as the leakage of urine associated with the sudden desire to void has been a growing health problem in the older adult population for many years (Aoki et al., 2017) The Centers for Disease Control and Prevention (CDC) reports that more than 51% of community-dwelling women aged 65 years and older experienced urinary leakage in 2014, with 12% reporting severe or very severe symptoms of bladder incontinence (Gorina et al., 2014). Symptoms of UUI have been shown to be more prevalent in those aged 75 and older compared to those 65 to 74 years of age (Gorina et al., 2014). Overall, women are twice as likely as men to experience symptoms of incontinence (Gorina et al., 2014). The prevalence of UUI differs by race/ethnicity. Data from the National Health and Nutrition Examination Survey (NHANES) showed that non-Hispanic white women were more likely to experience urine leakage compared to Mexican American and non-Hispanic black women (Gorina et al., 2014).

Cross sectional studies have shown obesity, hypertension, osteoarthritis, diabetes, limitations in activities of daily living (ADL), and depression associated with UUI among women (Espino et al., 2003; Greer et al., 2015; Linde et al., 2017; Qiu et al., 2022; Reigota et al., 2016). Longitudinal studies conducted to assess predictive factors have shown that women with obesity, stroke, high number of comorbidities, falls, dementia, depressive symptoms, or disability are more likely to develop UUI (Byles et al., 2009; Giraldo-Rodríguez et al., 2019; Goode et al., 2008).

The United Nations projects that the number of persons aged 65 and over will increase by 120% in the next

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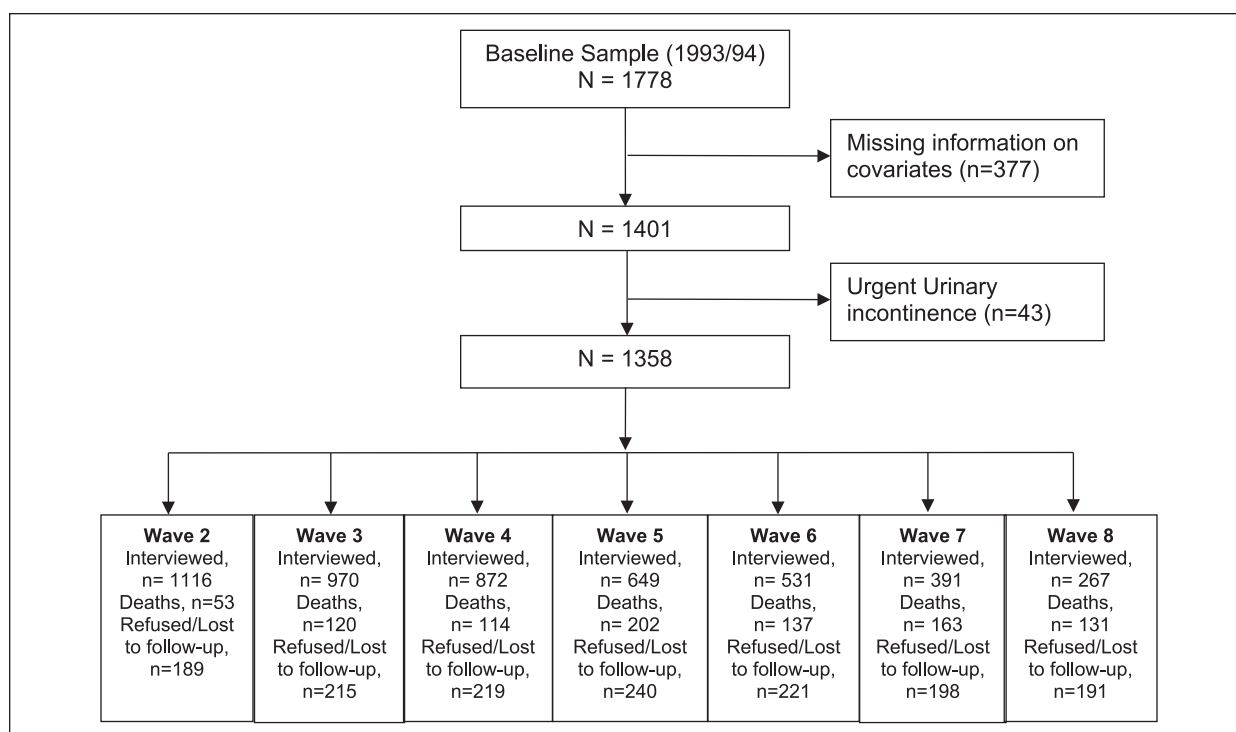Email: soalsnih@utmb.edu

Figure 1. Sample flow chart.

30 years (United Nations, 2019). The population of older adults in the U.S. is projected to increase 49.2% to 94.7% over the same period (Vespa et al., 2020). The Hispanic population in the U.S. has also been increasing steadily each year and is projected to increase 17.8% to 27.5% by 2060 (Vespa et al., 2020). This trend in population growth is accompanied by a growth in the prevalence of the comorbid conditions associated with older age, such as hypertension, osteoarthritis, cardiovascular disease, and diabetes (Christensen et al., 2009), increasing the risk of developing UUI.

Most of the studies examining predictor factors of UUI among women have been of cross-sectional design, short follow-ups, and conducted in non-Hispanic women. High rates of diabetes, obesity, ADL disability, and depressive symptoms have been reported in Mexican American older adults, all risk factors for UUI (Velasco-Mondragon et al., 2016). Therefore, the purpose of this study was to determine which socio-demographic, clinical, or functional factors are associated with UUI over 20-years of follow-up in a community-dwelling sample of Mexican American women aged 65 years and older without UUI at baseline.

Materials and Methods

Sample Selection

Data were from the Hispanic Established Population for the Epidemiologic Study of the Elderly (HEPESE), an ongoing longitudinal study of Mexican Americans aged 65 and older, residing in five southwestern states (Arizona, California, Colorado, New Mexico, and

Texas). The original HEPESE sample consisted of 3,050 participants interviewed in 1993 to 1994 at baseline who were followed up every 2 or 3 years. Information and data for the Hispanic EPESE are available at the National Archive of Computerized Data on Aging (Markides et al., 2016). The present study used data collected from baseline to Wave 8 (1993/1994–2012/2013). Of the 1,778 women participating in this study, we excluded 377 because of missing information at baseline interview on UUI, socio-demographic, clinical, and functional variables ($N=1,401$). Further, we excluded 43 participants who reported UUI at baseline leaving a sample size of 1,358. At the end of follow up (2012/2013), 267 participants were re-interviewed in person, 191 were lost to follow up or refused to be reinterviewed, and 900 were confirmed dead through the National Death Index and report from relatives (Figure 1). Excluded participants were significantly more likely to be older, unmarried, foreign-born, to have a lower body mass index (BMI), lower Mini Mental State Examination (MMSE) scores, poorer performance in the Short Physical Performance Battery (SPPB) and muscle strength, and to report more heart attack, stroke, diabetes, and cancer. The university's institutional review board approved the study protocol, and oral informed consent was obtained from each participant at the time of the interview.

Measurements

Independent variables. Socio-demographics (age, formal years of education, marital status, and nativity). Current smoking (Yes vs. No). Medical conditions included

self-reported hypertension, arthritis, diabetes, heart attack, stroke, cancer, or hip fracture. Depressive symptoms were assessed using the Center for Epidemiologic Study Depression Scale (CES-D ≥ 16; Radloff, 1977). Cognitive function was assessed using the MMSE (Folstein et al., 1975). Physical function was assessed using the SPPB, which includes three lower body extremity tests (walking speed, standing balance, and repeated chair stands). Scores range from 0 to 12 with higher scores indicating higher physical functioning (Mutambudzi et al., 2019). BMI was calculated as weight in kilograms divided by height squared in meters. BMI was grouped according to the National Institutes of Health (NIH) obesity standards: BMI <18.5 kg/m^2, underweight; 18.5 to 24.9 kg/m^2, normal weight; 25 to 29.9 kg/m^2, overweight; 30 to 34.9 kg/m^2, category I obesity, and BMI ≥35 kg/m^2, category II/ morbid obesity (National Heart, 1998). Hand grip strength was measured in kilograms in the dominant hand using a handheld dynamometer (Al Snih et al., 2002). Two trials were performed, with the higher of the two scores used for the analysis.

Outcome variables. UUI was determined through self-reporting. Participants were asked: In the past month, how often have you had difficulty holding your urine until you can get to a toilet: never, hardly ever, some of the time, most of the time, or all of the time? Participants were considered to have UUI if they had to hold the urine some of the time, most of the time, or all of the time at each wave. This question is similar to those used in the Established Populations for Epidemiologic Studies of the Elderly, 1996 to 1997: Piedmont Health Survey of the Elderly and other studies (Blazer & George, 2012; Wetle et al., 1995).

Statistical Analysis

Chi-square, *t*-test, and Fisher exact test were used to examine the distribution of the variables by UUI status at baseline. Generalized Estimating Equation (GEE) models using the GENMOD procedure in SAS were used to estimate the odds ratio (OR) of developing UUI over 20 years as a function of socio-demographics, smoking status, obesity, medical conditions, depressive symptoms, cognitive function, SPPB score, and hand grip strength among women without self-reported UUI at baseline. The models used a logit link binomial distribution and autoregressive correlation structure to account for repeated measures of participants (Zeger & Liang, 1986). All variables were analyzed as time varying (with the potential to change over time) except for age, education, and nativity. Those participants who died, refused, or were lost to follow-up were included until their last follow up (last interview date during the 20-year follow-up period). All analyses were performed using the SAS System for Windows, version 9.4 (SAS Institute, Inc., Cary, NC).

Results

Table 1 presents the overall baseline characteristics of the sample and by UUI status at baseline. The average of age of the overall sample was 72.7 [Standard Deviation (*SD*)=6.1] years, 43.5% were married, 58.2% were U.S.-born, and the mean years of education was 4.9 (*SD*=3.7) years. The most common medical conditions were hypertension, arthritis, and diabetes. Seventy-two percent had a BMI ≥25 kg/m^2 and 26.3% reported high depressive symptoms. Those experiencing UUI were significantly more likely to be older, have a higher level of education, be current smokers (18.6%), have hypertension (74.4%), arthritis (65.1%), diabetes (39.5%), stroke (16.3%), cancer (16.3%) hip fracture (9.3%), high depressive symptoms (41.9%), and have lower scores in the SPPB (5.9 ± 3.1) than those without UUI. The percent of those with UUI increased from 3.1% at baseline to 21.9% in wave 8 (Figure 2).

Table 2 presents the odds ratio (OR) of UUI over 20 years of follow-up among women without self-reported UUI at baseline (N=1,358). The OR of UUI per year was 1.04 [95% Confidence Interval (CI)=0.99–1.08)]. Current smokers (OR=2.32, 95% CI=1.17–4.61), BMI of 25 to <30 (OR=1.49, 95% CI=0.99–2.26), BMI of 30 to <35 (OR=2.82, 95% CI=1.79–4.46), BMI of ≥ 35 (OR=2.26, 95% CI=1.31–3.90), arthritis (OR=1.73, 95% CI=1.18–2.54), previous heart attack (OR=1.57, 95% CI=1.01–2.44), and depressive symptoms (OR=2.04, 95% CI=1.47–2.82) were factors associated with greater odds of UUI over time. Women with higher MMSE scores and higher performance in the SPPB tests had lower odds of UUI over time.

Discussion

This study examined the factors associated with UUI over time in Mexican American women aged 65 and older without self-reported UUI at baseline. We found that the percent of those with UUI increased over 20 years, from 3.1% to 21.9%. We found arthritis, being current smoker, overweight, obesity category I, obesity category II/morbid obesity, depressive symptoms, and previous heart attacks were associated with UUI. Women with higher MMSE and SPPB scores had lower odds of UUI over time.

Many of the proposed reasons for why certain factors are associated with UUI are multifactorial. For example, overweight and obesity/morbid obesity could contribute to incontinence due to systemic changes that cause pelvic floor damage and impairment in detrusor and sphincter muscles (Subak et al., 2009). The association between smoking and incontinence has been studied, with possible causes including the development of chronic obstructive pulmonary disease (COPD) leading to cough-related incontinence and increased peak pressure caused by coughing in chronic smokers (Fuganti et al., 2011). Arthritis may be an associated factor in women because

Table 1. Baseline Descriptive Characteristics of the Sample Among Mexican American Women by UUI Status at Baseline (*N* = 1,401).

Independent variables	Overall N (%)	Self-reported UUI N (%)	Without self-reported UUI N (%)	*p*-Value
Total	1,401 (78.8)	43 (3.1)	1,358 (96.9)	
Age (years), *M* ± *SD*	72.7 ± 6.1	74.4 ± 7.3	72.6 ± 6.1	.0574
Marital status (married)	609 (43.5)	18 (41.9)	591 (43.5)	.8769
Education (years), *M* ± *SD*	4.9 ± 3.7	6.1 ± 4.3	4.8 ± 3.7	.0332
Native US born	815 (58.2)	27 (62.8)	788 (58.03)	.6382
Current smokers	125 (8.9)	8 (18.6)	117 (8.6)	.0490
Hypertension	672 (48.0)	32 (74.4)	640 (47.1)	.0005
Arthritis	664 (47.4)	28 (65.1)	636 (46.8)	.0199
Diabetes	324 (23.1)	17 (39.5)	307 (22.6)	.0155
Heart attack	122 (8.7)	6 (14.0)	116 (8.5)	.2626
Stroke	63 (4.5)	7 (16.3)	56 (4.1)	.0024
Cancer	73 (5.2)	7 (16.3)	66 (4.9)	.0055
Hip fracture	48 (3.4)	4 (9.3)	44 (3.2)	.0562
Depressive symptoms (CES-D ≥16)	369 (26.3)	18 (41.9)	351 (25.9)	.0227
BMI (kg/m^2), *M* ± *SD*	28.6 (5.8)	29.0 (5.4)	28.6 (5.8)	.6195
BMI (kg/m^2) categories				.8725
Underweight (<18.5)	18 (1.3)	0 (0%)	18 (1.3)	
Normal weight (18.5–<25)	370 (26.4)	9 (20.9)	361 (26.6)	
Overweight (25–<30)	511 (36.5)	17 (39.5)	494 (36.4)	
Obesity category I (30–<35)	320 (22.8)	12 (27.9)	308 (22.7)	
Obesity category II/morbid obesity (≥35)	182 (13.0)	5 (11.6)	177 (13.0)	
SPPB, *M* ± *SD*	6.9 ± 3.0	5.9 ± 3.1	6.9 ± 3.0	.0258
Cognition (MMSE), *M* ± *SD*	25.3 ± 3.7	25.6 ± 3.9	25.3 ± 3.7	.5969
Hand grip strength (kg), *M* ± *SD*	18.8 ± 6.4	17.9 ± 6.3	18.8 ± 6.4	.3336

Note. SD = standard deviation; BMI = Body Mass Index; SPPB = Short Physical Performance Battery; MMSE = Mini Mental State Examination; CES-D = Center for Epidemiologic Study Depression Scale.
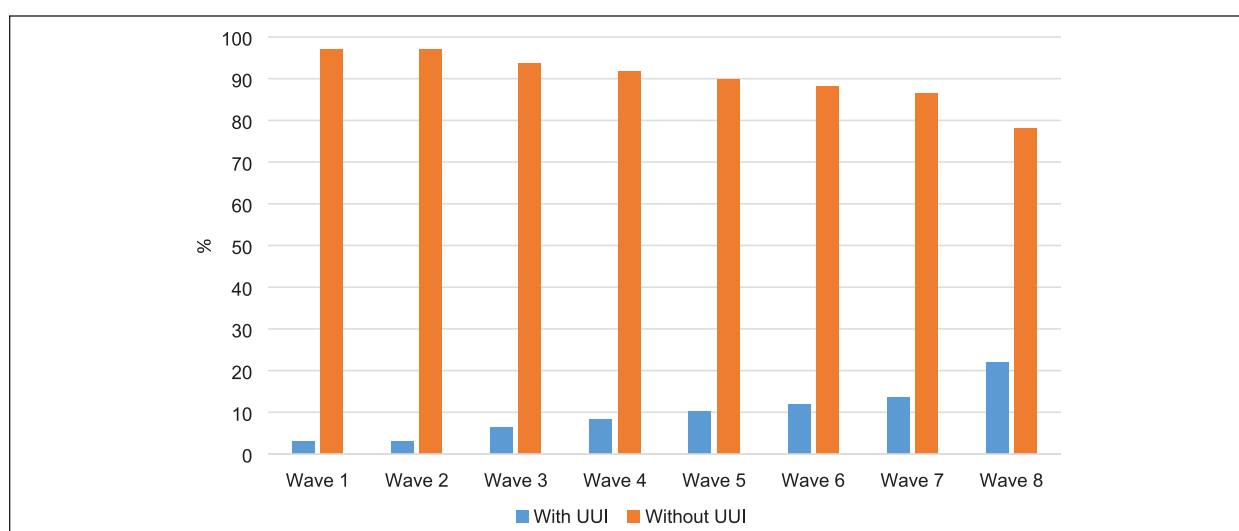
Figure 2. Percent of UUI among Mexican American women over time (*N* = 1,401).

of overactive bladder that comes with age or mobility disability (Scime et al., 2022; Tsai & Liu, 2009; Turner-Stokes & Frank, 1992). Cognition and physical disabilities have also been shown to be associated with incontinence as they decline, possibly due to an inability to reach the bathroom in a timely manner in those with physical disabilities (Schumpf et al., 2017). Depression and its association with incontinence has been suggested

Table 2. Generalized Estimating Equation Models For UUI Over Time Among Mexican American Women Without UUI at Baseline (*N* = 1,358).

Independent variables	Odds ratio (95% CI)	*p*-Calue
Time (years)	1.04 (0.99–1.08)	.0738
Age (years)	1.01 (0.97–1.06)	.6419
Marital status (married)	1.22 (0.84–1.78)	.2983
Education (years)	1.04 (0.99–1.09)	.1296
Native U.S.-born	1.04 (0.73–1.48)	.8339
Current smokers	2.32 (1.17–4.61)	.0157
Hypertension	1.36 (0.94–1.96)	.1001
Arthritis	1.73 (1.18–2.54)	.0047
Diabetes	1.25 (0.88–1.77)	.2100
Heart attack	1.57 (1.01–2.44)	.0439
Stroke	1.39 (0.84–2.30)	.1980
Cancer	1.14 (0.62–2.07)	.6769
Hip fracture	1.21 (0.53–2.80)	.6478
Depressive symptoms (CES-D ≥16)	2.04 (1.47–2.82)	<.0001
BMI (kg/m^2) categories		
Underweight (<18.5)	0.59 (0.16–2.15)	.4203
Normal weight (18.5–<25)	Reference	
Overweight (25–<30)	1.49 (0.99–2.26)	.0584
Obesity category I (30–<35)	2.82 (1.79–4.46)	<.0001
Obesity category II/morbid obesity (≥ 35)	2.26 (1.31–3.90)	.0034
SPPB	0.89 (0.85–0.93)	<.0001
Cognition (MMSE)	0.96 (0.93–0.99)	.0057
Handgrip strength	0.98 (0.95–1.01)	.2062

Note. CI = confidence interval; CES-D = Center for Epidemiologic Study Depression Scale; BMI = body mass index; SPPB = Short Physical Performance Battery; MMSE = mini mental state examination.

to be related to the changes in the levels of serotonin seen in those with depression, as this neurotransmitter is involved in the function of the urethral sphincter (Melville et al., 2005). Those with decreased cognitive function or dementia experience central disturbances of the detrusor activity which is regulated by certain parts of the brain, and by autonomic dysfunction which could possibly lead to incontinence (Si Ching, 2017).

Some of our findings are in line with previous studies of the factors associated with UUI. Byles et al. (2009), in their longitudinal study conducted on older adult women, found that BMI, dementia, and stroke were significantly associated with UUI, a finding similar to those of our study. Interestingly, they found no association of smoking with the development of UUI, in contrast to our findings. Analysis by Goode et al. (2008) further supports stroke as predictor factor of UUI. In their study of older Mexican adults Giraldo-Rodríguez et al. (2019) concluded that depressive symptoms and physical disability were predictors of UUI, supporting our findings as well. Arthritis as a factor associated with UUI has not been studied extensively in longitudinal studies. Hypertension and diabetes in our study were not associated with UUI which differs from previous studies where an association between hypertension and diabetes with UUI has been reported (Batmani et al., 2021).

This study has several limitations. First, UUI was self-reported, which may impact the reliability of the variable. Diagnostic testing is the more definitive method of recording UUI. Second, the survey lack of questions that distinguish between urge, stress, or mixed UUI. Third, the survey did not collect information of potentially relevant factors related to the reproductive system, such as pelvic organ prolapses. Fourth, incontinence is an embarrassing subject to discuss, which may cause participants to underreport their symptoms. Fifth, information on treatment or whether participants visited a physician for UUI was not collected. Finally, our findings are only generalizable to Mexican Americans living in the Southwestern US. Despite these limitations, this study's strengths are information from 20-years of follow-up, allowing for a more accurate representation of changes and the development of new cases over time, and the inclusion of socio-demographics, smoking status, BMI, medical conditions, depressive symptoms, cognitive function, and objective measures of physical function (SPPB) as time varying. The population used in this study is the fastest growing in the U.S. and is distinct in its vulnerability in terms of health care, such as limited access to care, decreased health literacy, and less favorable health outcomes (Velasco-Mondragon et al., 2016).

Conclusion

We found that certain factors are associated with UUI in older Mexican American women. We found smoking, BMI, arthritis, depressive symptoms, and previous heart

attacks are all associated with UUI over time. Higher cognitive and physical ability were found to be protective. Our study has several implications for the care of older Mexican American women. Maintenance of a healthy weight, proper management of arthritis and depressive symptoms, and preserving cognitive and physical function may delay UUI and increase quality of life in this underserved population.

Ethical Approval

The study and all research protocols were approved by the Institutional Review Board (IRB) of the University of Texas Medical Branch (IRB approval number: 92–85).

Informed Consent

Informed verbal consent was approved by the Institutional Review Board of the University of Texas Medical Branch.

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Availability of Data and Materials

The datasets generated during and/or analyzed during the current study are available at https://www.icpsr.umich.edu/icpsr-web/NACDA/series/546.

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