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Prevalence and incidence of urinary incontinence in a diverse population of women with noncancerous gynecologic conditions

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Abstract

Objective—To determine the prevalence and incidence of urinary incontinence (UI) in a diverse cohort of women presenting with noncancerous gynecologic conditions and to assess factors associated with UI prevalence and incidence.

Methods—We conducted a secondary analysis of data from SOPHIA (Study of Pelvic Problems, Hysterectomy and Intervention Alternatives), a longitudinal study of women with noncancerous gynecologic conditions (bleeding, pelvic pain, and symptomatic fibroids). UI was defined as incontinence in the last 4 weeks as reported on interviewer-administered annual questionnaires. We also evaluated the type of UI: stress (SUI), urge (UUI) or mixed incontinence (MUI).

Results—The study population of 907 women was 40.8% White, 28.0% African American, 17.3% Latina and 8.1% Asian. The mean age was 44.1 ± 5.4 years and 48.5% had an annual household income of ≤$50,000. The overall prevalence of any UI was 51.1%. At baseline, SUI was the most common at 39.4% followed by UUI at 23.7% and MUI at 18.9%. The average annual incidence for any UI was 4.2%. 13% of the women who underwent hysterectomy developed incident UI after their surgery. In multivariable logistic regression analysis, prevalent UI was associated with the following: age in decades (OR 1.6, 95% CI 1.2, 2.2), Latina race/ethnicity compared to white (OR 2.1, 95% CI 1.3, 3.3), and parity (OR 1.7, 95% CI 1.2, 2.4). None of the factors evaluated were associated with incidence of UI.

Conclusion—Urinary incontinence is very common in women seeking care for noncancerous gynecologic conditions, particularly among older, parous Latinas.

Keywords

Urinary incontinence; epidemiology; prevalence; incidence

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Introduction

Urinary incontinence (UI) is common and costly and strongly diminishes quality of life, yet patients often fail to disclose it to their physicians. In the United States, the overall prevalence of UI is 16% in adult women.(1) Numerous factors have been associated with prevalence of UI including age, increasing parity and higher body mass index (BMI), lower socioeconomic status, depression, diabetes, fibroids, and hysterectomy.(1-3) In addition, numerous epidemiologic studies suggest that prevalence of UI and its subtypes may differ by race/ethnicity and socioeconomic status.(3-5) More specifically, several studies have reported that white women have higher rates of stress incontinence compared to African American women, while African American women have higher rates of urge incontinence. (4,6,7) However, data are conflicting in Hispanic women (3,8,9) and relatively limited in Asians.(3,10)

Most epidemiologic studies of urinary incontinence focus on older women and assess prevalence and not incidence.(6,11,12) While prevalence reflects the proportion of affected individuals at a given time point, incidence is important because it reflects the rate of new-onset cases. Data are also limited regarding the prevalence and incidence of urinary incontinence in women presenting with noncancerous gynecologic complaints, such as fibroids, bleeding, and pelvic pain. These conditions are common; the majority of the over 600,000 hysterectomies performed each year are for fibroids (37%), bleeding disorders (19%) and endometriosis / pelvic pain (12%).(13) Women who present to their obstetrician-gynecologists with these symptoms are likely focused on these particular complaints and may not mention their co-existing urinary incontinence or voiding difficulties. It is well-known that urinary incontinence is under-reported, and fewer than half of incontinent women spontaneously divulge their symptoms to their healthcare providers.(14) Knowing the prevalence of urinary incontinence among women presenting with noncancerous uterine conditions is important, as women often present to their gynecologist with bleeding, symptomatic fibroids, or pain, and, if UI is common, these visits provide an opportunity to screen, diagnose and manage urinary incontinence, while diagnosing and treating the patient's presenting symptoms. Furthermore, because many of these noncancerous conditions can be managed surgically, knowledge about coexisting UI could impact decision-making. For example, a patient with both symptomatic fibroids and stress incontinence may be more likely to opt for surgery to treat both conditions.

The Study of Pelvic Problems, Hysterectomy and Intervention Alternatives (SOPHIA), a longitudinal study of women with symptomatic fibroids, abnormal uterine bleeding without fibroids and and/or pelvic pain,(15,16) provided a unique opportunity to analyze the prevalence and incidence of UI in a cohort of women with noncancerous uterine conditions. Our objective for this secondary data analysis was to estimate the prevalence and incidence of urinary incontinence as well as UI subtypes in diverse women with noncancerous gynecologic conditions. We also sought to assess factors associated with both the prevalence and incidence of urinary incontinence in this population, especially the role of race / ethnicity.

Materials and Methods

Data Source

This is a secondary data analysis of the Study of Pelvic Problems, Hysterectomy and Intervention Alternatives (SOPHIA), which was a longitudinal study of women aged 31-54 years who sought care for symptomatic fibroids, abnormal bleeding and/or pelvic pain. (15,16) Although patient recruitment, methods and baseline characteristics have been previously described in detail, we will present a brief description of SOPHIA. (15) Women

were recruited from practices affiliated with the University of California, San Francisco, San Francisco General Hospital, Kaiser Permanente Northern California and community hospitals in San Francisco, and followed for up to 8 years. The study population for the full cohort of SOPHIA subjects was racially and socioeconomically diverse with the following characteristics: 41.9% White, 25.8% Black, 17.5% Latina and 11.0% Asian; 19.7% had a high school education or less; 55.1% with an annual household income of < $50,000.(15) In addition, 23.7% were born outside of the United States and 10.7% elected to be interviewed in Spanish or Chinese (Cantonese or Mandarin).

The goals of SOPHIA were to better understand the effect of noncancerous gynecologic conditions on health-related quality of life and sexual functioning over time, as well as to identify predictors of hysterectomy and other alternative treatments and long-term satisfaction with these therapies. There were two phases of the study and each was four-years in length. Women completing the first phase were invited to enroll in the second phase, along with newly recruited participants. Data from SOPHIA were collected prospectively via interviewer-administered annual questionnaires. Questions regarding urinary incontinence (UI) were added at the beginning of the second phase; we therefore only included women who enrolled in this phase and had baseline UI data. Of the 934 women who were enrolled in the second phase, 907 (97.1%) had baseline UI data. For calculating incidence, we included only those with baseline UI data and at least one follow-up visit, as these data were critical to identifying which women developed incident urinary incontinence. Of the 907 with baseline UI data, 867 had a least one follow-up visit, and of these 867 women, the mean (± SD) number of visits was 2.74 ± 0.69 and the median number of visits was 3 (range 1 - 4). Women with a history of surgery for incontinence or a prior hysterectomy were excluded. As this study was a secondary data analysis of de-identified data from SOPHIA, IRB exemption was granted.

Outcomes and covariates

The questions regarding urinary incontinence, voiding symptoms and impact of these symptoms were administered by an interviewer at the baseline visit and then each year in a similar manner. Subjects could also elect to be interviewed in Spanish or Chinese. Urinary incontinence was based on an affirmative response to the question “During the last four weeks, did you experience any incontinence? By incontinence, we mean involuntary loss of urine with coughing, sneezing, laughing, straining or movement, or loss of urine before reaching the toilet.” All subtypes of UI were based on their symptoms over the last four weeks. We defined stress urinary incontinence (SUI) as a report of loss of urine when coughing, sneezing, laughing or straining that occurred sometimes, often or always versus never or rarely. Urge urinary incontinence (UUI) was based on the report of loss of urine before reaching a toilet that occurred sometimes, often or always. An affirmative response to both SUI and UUI on the same annual questionnaire was the definition for mixed urinary incontinence (MUI).

Prevalent incontinence was defined as the number of women at baseline who reported any incontinence divided by the total number of women in the baseline cohort. Cumulative incidence was equivalent to the number of women who reported new-onset incontinence during the four years of follow-up divided by the number of women at risk during this time period. We calculated annual average incidence by dividing the cumulative incidence by four.

Participants were asked about additional voiding symptoms that occurred sometimes, often or always over the previous four weeks: 1) Nocturia: voiding two or more times during the night, 2) Urgency: the uncomfortable strong need to pass urine, 3) Dysuria: burning when passing urine, 4) Difficulty voiding: inability to pass urine, 5) Slow stream: a slow stream

when passing urine, and 6) Incomplete emptying: the sensation of continued need to pass urine after emptying bladder. We also asked about current and prior treatment with Kegel exercises as well as pessaries.

A modified incontinence impact questionnaire was administered which inquired about the impact of UI on six domains. The participants were asked "how much did urinary incontinence interfere with the following things?" 1) Your mood, 2) Your ability to walk or move about, 3) Your sleep, 4) Your normal work (including both inside and outside the home), 5) Your ability to have and enjoy sex, and 6) Your enjoyment of life. Each question was scored on a scale of 1-5 (1=not at all, 2=slightly, 3=moderately, 4=quite a bit, 5=a great deal). A higher score reflected greater impact of incontinence, and the highest possible score was 30.

Sociodemographic variables, which included age, race/ethnicity (Asian, African American, Latina, White and Other), marital status, education, annual household income, and occupational status (unemployed versus lowest (16 – 47.1), middle (47.2 – 69.2) or highest (≥ 69.3), level of occupational prestige which was based on the highest score for the participant or her partner(17)), were included in this analysis. We also evaluated clinical characteristics including parity, menopausal status, and type of noncancerous gynecologic conditions [(1) heavy bleeding, 2) pelvic pain, 3) heavy bleeding with fibroids, 4) bleeding and pain and 5) fibroids and pressure]. Health-related quality of life was measured using the mental (MCS) and physical (PCS) component summary scores of the Medical Outcomes Study (MOS) Short-Form (SF) 36 scale.(18) Data regarding whether or not a hysterectomy was performed during the study period were obtained from the participants during their interviews or supplemented via chart review for participants who had discontinued their interviews. We evaluated incident urinary incontinence after a hysterectomy, which was defined as urinary incontinence that was not reported at baseline or any time prior to a hysterectomy and began to be reported any time after the year in which the hysterectomy was performed.

Statistical Analysis

We calculated means, standard deviations and percentages for sociodemographic and clinical data for our study population. Prevalence and cumulative incidence were then calculated for any urinary incontinence as well as for the incontinence subtypes of SUI, UUI and MUI. After univariate analyses, we conducted bivariate analyses to explore variables that were associated with either prevalent or incident urinary incontinence. Variables that were significantly associated with either prevalence or incidence with a P value < .10 were included in a multivariable logistic regression model. The full model was then reduced using a backward elimination procedure that removed nonsignificant variables (P ≥ .15). Results were based on the number of subjects responding to each question. We did not impute values for missing data. We used SAS Version 9.1 (Cary, North Carolina) and STATA 10.0 (StataCorp, College Station, Texas) for our analyses.

Results

Data from 907 SOPHIA participants were included in the analysis. Their mean age was 44.1 ± 5.4 years, and they comprised a racially/ethnically and socioeconomically diverse group of women (Table 1). 40.8% of the participants were White, 28% were African American, 17% were Latina and 8% were Asian. 17% had a high school education or less, and 48% had an annual household income of ≤ $50,000. The noncancerous gynecologic conditions these women were experiencing included symptomatic fibroids (43% had fibroids with bleeding and 11% had fibroids with pressure); heavy bleeding (6%), pelvic pain (22%), and bleeding

and pain (18%). 77 (8.5%) of these participants underwent hysterectomy during their follow up period.

Over half of the participants reported urinary incontinence at their baseline interview (51.1%) (Table 2). Stress incontinence was the most common UI subtype (39.4%), followed by urge (23.7%) and mixed incontinence (18.9%). The cumulative incidence over 4 years for any type of UI was 16.7% (SUI 16.1%, UUI 13.8%, and MUI 13.7%), yielding an annual average incidence for any UI of 4.2%. For incidence incontinence, 72/907 (7.9%) participants had missing data. If we assume that none of these women developed UI over the entire study period, the most conservative estimate for incidence would be 15.3%, corresponding to a 3.8% annual average incidence. The mean score on the modified urinary incontinence impact questionnaire was 11.0 ± 5.3, out of a total possible score of 30. Women experienced several additional voiding symptoms, the most common of which was urinary urgency (51%), nocturia (43%) and incomplete bladder emptying (42%) (Table 2).

White women had the lowest prevalence of incontinence (46%), followed by African-American women (50%), Asians (52%) and Latinas (67%). In multivariable logistic regression, prevalence remained associated with race/ethnicity, with Latinas having a higher odds of prevalent UI compared to white women (OR 2.1, 95% CI 1.3, 3.3) (Table 3). Prevalence was also associated with increasing age (OR 1.6, 95% CI 1.2, 2.2 for each decade of life), parity (OR 1.7, 95% CI 1.2, 2.4), PCS score (OR 0.85, 95% CI 0.79, 0.92 for every 5-point interval) and MCS score (OR 0.87, 95% CI 0.83, 0.95 for every 5-point interval).

We also explored which variables were associated with prevalence for the UI subtypes. Stress incontinence was associated with same variables as any UI (Table 3). Urge incontinence was not associated with race/ethnicity but was associated with age, MCS and PCS scores and level of education. Specifically, women with a high school degree or less (OR 2.4, 95% CI 1.5, 3.8) and those with some college education (OR 1.9, 95% CI 1.3, 2.9) were at higher risk for UUI compared to women with a college degree or more.

We found no significant associations between incidence of UI and any of the sociodemographic or clinical variables. Among the 77 women who underwent hysterectomy during the study period, 10 (13.0%) developed incident incontinence after surgery.

Discussion

In our relatively young cohort of women presenting with noncancerous gynecologic conditions, we found that over half had coexisting urinary incontinence, and on average, an additional 4% developed UI each year. Furthermore, many women in our study reported symptoms of urinary urgency, nocturia and incomplete bladder emptying. These estimates highlight how common urinary incontinence and abnormal voiding symptoms are among women seeking care for noncancerous uterine conditions, underscoring the importance of screening and simultaneously managing these symptoms along with their other gynecologic issues. It is likely that these women are focused on their fibroids, bleeding and/or pelvic pain and may not report their urinary symptoms. In fact, we know that less than half of those with incontinence divulge their symptoms during healthcare visits.(11) Furthermore, we found that Latina compared to white women had a higher risk of incontinence, and a potential language barrier may further prevent them from raising the issue of UI. Thus, for clinicians who care for women with common gynecologic conditions such as fibroids, abnormal bleeding and/or pelvic pain, it is important to inquire about any urinary incontinence or abnormal voiding symptoms, particularly in the higher-risk Latina population.

Similar to prior studies, we found that age and parity were associated with a higher risk of prevalent UI.(1,3,19) In our study, Latinas were significantly more likely than white women to report prevalent UI and SUI. Data regarding prevalence of UI in the Latina / Hispanic population are conflicting, with some studies finding a higher prevalence (4,9) while other studies reporting a lower prevalence.(3,8,20) However, these population-based studies assessed women without symptomatic gynecologic issues versus our study population which was comprised of women who sought care for noncancerous pelvic conditions. Our findings highlight why it is particularly important to screen for UI in Latina women presenting with general gynecologic complaints. This issue will become increasingly more important given the growing Hispanic population in the United States, which is estimated to increase from 44.3 million in 2006 (14.8% of the total population) to 102.6 million in 2050 (24.4% of the total population).(21)

A prevalence of 51% in our study population underscores how critical it is to screen, diagnose and manage UI. When comparing our prevalence findings to those of previous studies, two major challenges are the differences in how urinary incontinence is defined and differences in the study population. The Study of Women's Health Across the Nation (SWAN) assessed monthly incontinence in community-dwelling women of a similar age to our study population and reported overall prevalence of 46.7%.(3) SUI was the most common at 25.2% followed by MUI at 12.4% and then UUI at 7.6%. They also reported that African-American and Hispanic women had a lower prevalence of monthly UI than Caucasians. However, for incidence of monthly UI, there were no differences by race/ethnicity. There are also several studies that use the National Health and Nutrition Examination Survey to estimate prevalence of incontinence.(1,4,19) Minassian et al.(19) found that the prevalence of at least monthly UI was 34.1% in women 40-49 years and 41.4% in women 50-59 years, estimates that are slightly lower than our results.

In our study population, the average annual incidence for any incontinence was 4.2% over four years of follow-up. This was similar to a study of 441 women aged 20-84 years in Austria with over 6 years of follow-up, that reported a mean annual incidence of 3.9%.(22) Other studies reported higher incidences. In the SWAN study, the average annual incidence was found to be 11% for women with a mean age of 46 years (3) and the Nurses' Health Study reported an annual incidence of 6.9% in women aged 36-55 years.(23) Although we found no variables associated with incident UI in our study population, higher BMI (3,24), high symptom sensitivity and poor health have been associated with incidence.(3)

The association between hysterectomy and urinary incontinence is controversial. This controversy stems from existing data that are conflicting, prior investigations which study different populations and use different definitions for UI, and the fact that urinary incontinence may develop many years after a hysterectomy. Several studies have reported an association between hysterectomy and prevalence of UI; (2,19,25) however, other studies report no association (26,27) or a reduction in incontinence after hysterectomy.(28,29) In a systematic review, Brown et al.(30) reported that the odds of UI in women with a hysterectomy were increased in women over 60 (OR 1.6, 95% CI 1.4, 1.8) but not in women younger than 60. In our study, the cumulative incidence of new-onset UI after hysterectomy was 13%, which is higher than the 4.7% risk of new-onset UI in a randomized trial of total versus supracervical hysterectomy.(31) However, given the relatively low number of women with incident UI after hysterectomy, we can not draw any definitive conclusions regarding the specific impact of hysterectomy on incidence of UI.

Strengths of our study include that our study population was racially, ethnically and socioeconomically diverse and that participants were recruited from a variety of practice settings, including an academic institution, a county hospital, a managed care organization

and several community hospitals. In addition, the longitudinal nature of the study enabled us to contribute to data on incidence of urinary incontinence, including the impact of hysterectomy on subsequent development of urinary incontinence. Furthermore, participants could choose between being interviewed in English or Spanish, enhancing the diversity of our sample and enabling us to study Latinas with a broad range of acculturation. Lastly, we were able to report on characteristics specific to a cohort of women with noncancerous pelvic problems, which is representative of the practices of many obstetrician-gynecologists.

There were also limitations. Although our study population was socioeconomically and racially diverse, participants lived and received care in one geographic area, and thus, our results may not be generalizable to women in other parts of the country. Another limitation is that there were missing data. For a five-year longitudinal study of 934 women, the percent of missing data were fairly low; however, if we assume that those with missing data did not have prevalent UI or develop incident UI, then the most conservative estimates for prevalence would be 49.6% (463/934) and cumulative incidence would be 15.3%. We would argue that these estimates are not significantly different from what we reported, prevalence of 51.1% and cumulative incidence of 16.7%. In addition, while it is possible that our data may slightly over-estimate the true prevalence and incidence, we do not believe that nonresponders would report findings different than responders for urinary incontinence. We also did not have data regarding body mass index (BMI) or diabetes mellitus, both of which have been associated with urinary incontinence in other studies.(2,3,23,32) We did not use a validated urinary incontinence impact questionnaire; however, we did use a modified questionnaire that assessed the impact of UI on six domains which are commonly evaluated in validated questionnaires.

In conclusion, we have shown that over half of women presenting with symptomatic fibroids, abnormal bleeding and/or pelvic pain have co-existing urinary incontinence. Each year, approximately 4% more will develop urinary incontinence. Because urinary incontinence is common in this cohort of women, it is critical to screen for this bothersome condition and to remember to simultaneously manage both the patient's presenting gynecologic complaints as well as her urinary incontinence symptoms. Given that urinary incontinence is significantly under-reported, clinicians must be keenly aware of screening, diagnosing and managing this bothersome condition in order to improve the quality of life of these women.

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Table 1
Sociodemographic and Clinical Characteristics (Total N = 907)

Sociodemographics	
Age (y, mean ± SD) (n = 903)	44.1 (5.4)
Race/ethnicity (n = 896)	
Asian	73 (8.1)
Black, African American	254 (28.0)
Latina, Latin American	157 (17.3)
White	370 (40.8)
Other	42 (4.6)
Married/living with partner (n = 874)	485 (55.5)
Education (n = 903)	
High school or less	158 (17.5)
Some college	248 (27.5)
College degree or more	497 (55.0)
Annual household income ($) (n = 842)	
Less than 25,000	190 (22.6)
25,001 – 50,000	218 (25.9)
50,001 – 100,000	266 (31.6)
More than 100,000	168 (20.0)
Occupational status (n = 835)	
Unemployed	30 (3.6)
Lowest prestige (16-47)	327 (39.2)
Middle prestige (47-69)	346 (41.4)
Highest prestige (68-86)	132 (15.8)
Clinical characteristics	
Symptoms (n = 806)	
Fibroids and heavy bleeding	345 (42.8)
Fibroids and pressure	90 (11.2)
Heavy bleeding	50 (6.2)
Pelvic pain	180 (22.3)
Bleeding and pain	141 (17.5)
Premenopausal (n = 902)	745 (82.6)
Parous (n = 907)	449 (49.5)
SF-36 (n = 903)	
Overall health (#, % reporting excellent or very good)	213 (23.5)
Physical Component Summary (PCS) score (mean ± SD)	46.4 (12.0)
Mental Component Summary (MCS) score (mean ± SD)	46.4 (10.5)

Note: SD, standard deviation. All numbers are n (%) unless otherwise noted. Percentages are based on number of patients responding to each question, and the number of respondents is denoted after each variable.

Table 2

Prevalence and Incidence of Urinary Incontinence, Urinary Symptoms and Impact of Urinary Incontinence (Total N = 907)

Urinary Incontinence	
Prevalence of incontinence – all types * (n = 907)	463 (51.1)
Stress incontinence	355 (39.4)
Urge incontinence	214 (23.7)
Mixed incontinence	170 (18.9)
Uncharacterized type of incontinence	64 (7.1)
Cumulative incidence of incontinence – all types * (n = 835)	139 (16.7)
Stress incontinence	135 (16.1)
Urge incontinence	116 (13.8)
Mixed incontinence	114 (13.7)
Uncharacterized type of incontinence	2 (1.4)
Impact of Urinary Incontinence	
Mean ± SD impact score (n = 370 of 463 with UI)	11.0 ± 5.3
Urinary Symptoms	
Urinary urgency (n = 906)	458 (50.6)
Nocturia (n = 906)	391 (43.2)
Incomplete emptying (n = 906)	376 (41.5)
Slow stream (n = 901)	228 (25.3)
Dysuria (n = 904)	106 (11.7)
Difficulty voiding (n = 899)	68 (7.6)
Current Treatment	
Anticholinergics (n = 903)	9 (1.0)
Kegel exercises (n = 903)	206 (22.8)

Note: SD, standard deviation. All numbers are n (%) unless otherwise noted. Percentages are based on number of patients responding to each question and the number of respondents is denoted after each variable.

* Number of women with stress and urge incontinence do not sum to the total number of women with incontinence as some women had an uncharacterized type of incontinence.

Table 3

Variables associated with prevalence of any urinary incontinence and stress and urge subtypes

Characteristic	Prevalence of any UI		Prevalence of SUI		Prevalence of UUI	
	Adjusted odds ratio	95% CI	Adjusted odds ratio	95% CI	Adjusted odds ratio	95% CI
Age in decades (y)	1.6	1.2, 2.2	1.8	1.3, 2.5	1.7	1.2, 2.5
Race / ethnicity						
White	Referent		Referent			
African American	0.9	0.6, 1.3	1.1	0.7, 1.6		
Latina	2.1	1.3, 3.3	1.9	1.2, 2.9		
Asian	1.2	0.6, 2.1	1.3	0.7, 2.5		
Other	0.9	0.4, 1.8	0.7	0.3, 1.5		
Education						
High school or less					2.4	1.5, 3.8
Some college					1.9	1.3, 2.9
College degree or more					Referent	
Parity						
Nulliparous	Referent		Referent			
Parous	1.7	1.2, 2.4	1.9	1.4, 2.7		
SF-36 PCS (per 5-point increase)	0.85	0.79, 0.92	0.88	0.81, 0.95	0.80	0.74, 0.87
SF-36 MCS (per 5-point increase)	0.87	0.83, 0.95	0.86	0.80, 0.91	0.87	0.81, 0.93

SF, short form; PCS, physical component summary; MCS, mental component summary. Model adjusted for variables listed in the table.