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CAFFEINE AND URINARY INCONTINENCE IN US WOMEN

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Abstract

Introduction and Hypothesis—The goal of this study was to characterize associations between caffeine consumption and severity of urinary incontinence (UI) in US women. We hypothesized that moderate and high caffeine intake would be associated with UI in US women when controlling for other factors associated with UI.

Methods—US women participated in the 2005–2006 and 2007–2008 National Health and Nutrition Examination Survey (NHANES), a cross-sectional, nationally representative survey. Using the Incontinence Severity Index, UI was categorized as "any" and "moderate/severe". Types of UI included stress, urge, mixed, and other. Food diaries were completed and average water (gm/day), total dietary moisture (gm/day), and caffeine (mg/day) intake were calculated into quartiles. Step-wise logistic regression models were constructed adjusting for: sociodemographics, chronic diseases, body mass index, self-rated health, depression, alcohol use, dietary water and moisture in take, and reproductive factors.

Results—From the 4309 non-pregnant women (aged ≥20 years) who had complete UI and dietary data, UI prevalence for any UI was 41.0% and 16.5% for moderate/severe UI, with stress UI the most common UI type (36.6%). Women consumed a mean caffeine intake of 126.7 mg/day. After adjusting for multiple factors, caffeine in take in the highest quartile (≥204 mg/day) was associated with any UI (prevalence odds ratio (POR)1.47, 95% CI 1.07, 2.01), but not moderate/severe UI (POR 1.42, 95% CI 0.98, 2.07). Type of UI (stress, urgency, mixed) was not associated with caffeine intake.

Conclusions—Caffeine intake ≥204 mg/day was associated with any UI, but not moderate/severe UI, in US women.

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Keywords

urinary; incontinence; caffeine; intake; women

Introduction

Urinary Incontinence (UI) is a prevalent condition with significant negative impact on quality of life and overall health. UI prevalence estimates vary considerably according to the definition used and among community-dwelling women ranges from 10–40% [1–4].

Caffeine is consumed more than any other stimulant drug in the world. The amount of caffeine in fluid varies considerably with coffee containing from 95 to 206 mg/8 oz cup, tea from 14 to 120 mg/8 oz cup, and carbonated beverages contain as high as 55 mg/12 oz serving [5]. Most Americans consume caffeine and it has been reported that approximately 80% of women drink caffeine-containing beverages daily [6]. The consumption of high-energy drinks with large amounts of caffeine (50–505mg/serving) is also on the rise in the United States(US) population[7].

Caffeine has a diuretic effect and also may affect the bladder by increasing detrusor pressure and promoting detrusor muscle excitability [8–11]. Epidemiologic and clinical cohort studies have demonstrated mixed results regarding the relationship of caffeine and fluid intake on UI in women [12–16]. Two large epidemiologic studies found conflicting conclusions on whether caffeine impacts incontinence [17,18]. Little robust evidence exists on caffeine and fluid management strategies. One randomized trial found a reduction in urinary urgency and frequency with caffeine reduction, while others have found that reducing excess fluid intake is beneficial[19,20].

Given the existing data, we hypothesized that moderate and high caffeine intake were associated with UI in US women when controlling for other factors associated with UI. We sought to further investigate the association between caffeine intake and urinary incontinence in an age-and racially-representative sample of community dwelling women from the US.

Materials and Methods

We utilized the publically available data from the 2005–06 and 2007–08 National Health and Nutritional Examination Surveys (NHANES) for this analysis. NHANES data are cross-sectional surveys of the nationally representative, non-institutionalized US population that are sampled bi-annually using a complex, stratified, multi-stage, probability cluster design. The National Center for Health Statistics Ethics Review Board and the University of Alabama at Birmingham Institutional Review Board approved the protocol.

NHANES participants were interviewed in their homes and then underwent standardized physical examination, including measured height and weight, and further questioning in a mobile examination center (MEC). Questions regarding UI were assessed by computer-assisted personal interviews methodology (CAPI). To define UI, we analyzed the data from the validated 2-item Incontinence Severity Index (ISI), which measures incontinence volume and incontinence frequency. The responses on the two questions are used to obtain a severity score ranging from 1 to 12, with an ISI score ≥ 3 categorized as moderate/severe UI [21]. Moderate/severe UI corresponds to at least weekly leakage or monthly leakage of volumes more than just drops. The question: “During the past 12 months, have you leaked or lost control of even a small amount of urine with activity like coughing, lifting, or exercise?” defined stress UI. Urge UI was defined based on the question: “ During the past 12 months,

have you leaked or lost control of even a small amount of urine with an urge or pressure to urinate and you couldn't get to the toilet fast enough?" In women who responded negatively to the stress and urge UI questions, a positive response to the question, "During the past 12 months, have you leaked or lost control of even a small amount of urine during nonphysical activities?" defined "other" incontinence. Positive responses to both the stress and urge UI questions defined mixed UI.

A multiple-pass dietary recall method, developed and validated by the US Department of Agriculture, was used for the dietary data [22]. Participants took part in two 24-hour dietary recall periods. The first 24-hour dietary recall was done during the initial CAPI and the second 24-hour dietary recall was done 3 to 10 days later by telephone.

From the two 24-hour dietary recall data, we reported averaged caffeine consumption (mg/day), water intake (gm/day), consisting of tap, bottled, plain or carbonated, sweet or unsweetened water, and total moisture (gm/day), consisting of all moisture present in foods and beverages[22]. Caffeine intake was categorized into quartiles based on the distribution of intake with lower (0–27 mg/day), lower middle (28–95 mg/day), upper middle (96–204 mg/day), and upper (>204 mg/day) quartiles. We analyzed both the upper quartile and the upper tenth percentile(≥348 mg/day) for association with UI. Caffeine intake was calculated from fluid (coffee, tea, and soda) and from food sources (chocolate)[22].

Water intake (tap, bottled, plain or carbonated, sweet or unsweetened water in grams) was divided into quartiles, with high water intake defined by the upper quartile. Total dietary moisture (from both foods and beverages) was categorized into quartiles and the upper quartile for moisture defined high intake. Alcohol intake was obtained through the alcohol use questionnaire and was dichotomized as "never drank alcohol" and "prior or current alcohol consumption".

Women self-reported their race/ethnicity and age was categorized in 10-year increments. BMI (kg/m^2) was categorized as less than 25.0 (underweight/normal weight), 25.0 to 29.9 (overweight), and 30.0 or more (obese). Education was categorized as up to a high school education (including a General Education Development or equivalent) or more than high school. The poverty income ratio (an indicator of socioeconomic status that uses the ratio of income to the family's poverty threshold set by the US Census Bureau) was categorized as less than 1 (below the poverty threshold), 1 to 2 (1–2x the poverty threshold), and greater than 2 (2x the poverty threshold).

Chronic disease data were ascertained through the questions "Has a doctor or other health professional told you that you had [diseases]?" Chronic diseases included: arthritis, stroke, emphysema, chronic bronchitis, asthma, coronary heart disease, angina, myocardial infarction, hypertension, and diabetes mellitus. Diabetes also included taking insulin and/or diabetic pills. The definition of hypertension included the diagnosis and/or taking antihypertensive medications. The cumulative number of chronic diseases was categorized as: 0, 1, 2, and 3 or more chronic diseases.

Self-rated general health status was defined by the question, "Would you say that in general your health is excellent, very good, good, fair, or poor?" Responses to this question were aggregated into 2 categories: excellent, very good or good health versus fair or poor. Depression was assessed using the validated Patient Health Questionnaire–9 (PHQ-9). The PHQ-9 yields scores from 0 to 27, and scores ≥10 used to define major depression[23].

From the NHANES reproductive health questions, vaginal deliveries, hormone therapy use, and prior hysterectomy were included. Vaginal births were categorized as none, 1–2, 3–4, or ≥4 and had a missing data rate of 25%. Hormone therapy use was ascertained with the

question, "Have you ever used female hormones such as estrogen and progesterone? Data on having a prior hysterectomy had a missing rate of 28%; therefore, women who reported having a period in the prior 12-months were also categorized as not having had a hysterectomy. Vaginal bulging was defined by the question: "Do you experience bulging or something falling out that you can see or feel in the vaginal area?" from the Pelvic Floor Distress Inventory [24].

All statistical analyses were calculated using STATA 8.2 (STATA Corp. College Station, Texas), which incorporates the design effect, appropriate sample weights, and the stratification and clustering of the complex NHANES sample design [25]. The Pearson's χ^2 test assessed the association between UI outcomes and demographic and medical characteristics with prevalence estimates and 95% confidence intervals (CI). Estimates with relative standard errors greater than 30% were identified as statistically unreliable. Multivariable logistic regression models were constructed using variables in a stepwise fashion with sociodemographic variables in Step 2 (age, race/ethnicity, education, and poverty status), comorbidity and BMI (Step 3), self-rated health and depression (Step 4), alcohol intake (Step 5), total fluid and moisture intake (Step 6), hysterectomy and the use of hormone replacement therapy (Step 7), and vaginal deliveries (Step 8). Given the decrease in the sample size by 25% (n=1552) by including women who had missing data on vaginal deliveries, this variable was included individually in the multivariable models. Prevalence odds ratios (POR) and 95% CIs were reported with the level of statistical significance set at $p<0.05$.

Results

A total of 10,914 NHANES participants aged 20 years and older were interviewed in their homes and then underwent standardized physical examination, including measured height and weight, and further questioning in a mobile examination center (MEC). After excluding men (n=5297), women who were pregnant at the time of the interview (n=393),women with incomplete UI data (n=745), and those with incomplete caffeine intake data (n=170) were excluded. A total of 4309 women were included in the final analytic data set. Women with missing data on UI or dietary recall for caffeine and water intake (n= 915/5617, 16.2%) were more likely to be ≥80 years of age, African American, and have less than a high school education ($p<0.05$).

UI prevalence was 41.0% (95% CI 38.9, 43.2) for any UI and 16.5% (95% CI 15.0, 18.1) for moderate/severe UI. In addition, 36.6% (95% CI 33.8, 39.5) reported stress UI, 17.0% (95% CI 15.2, 18.9) reported urge UI, 25.5% (95% CI 23.6, 27.4) reported mixed UI, and 7.8% (95% CI 6.7, 9.1) had "other" UI.

In univariate analyses, UI was significantly associated ($p<0.005$) with several factors including: age, race/ethnicity, less education, low poverty-income ratio, obesity, "fair/poor" self-rated health, major depression, having more chronic diseases, alcohol use, the use of hormone replacement therapy, history of a hysterectomy, increasing number of vaginal deliveries (0 vs 1, 2, 3, and 4 or more) and reporting a vaginal bulge (Table 1). The prevalence of UI increased in the population by quartile of caffeine intake (p for trend <0.001, Figure 1)with the prevalence of any UI ranging from 34% in lower quartile to 49% in the upper quartile.

Mean caffeine intake was 127 mg day (range 0 to 2715 mg/day).In the univariate analyses (Table 2), caffeine intake in the upper quartile(≥204mg/day) was associated with any UI ($p< 0.001$) and moderate/severe UI ($p= 0.005$). Caffeine intake in the top tenth percentile of intake(≥348mg/day),was significantly associated with a higher prevalence of any UI

(p=0.008), but not moderate/severe UI (p=0.23). Water intake in the upper quartile (>1304mL per day) was associated with a lower prevalence of moderate/severe UI (p< 0.001), but no association was seen with any UI. Total moisture in the upper quartile (≥3319 gm/day) was associated with any UI (p=0.001), but was not associated with moderate/severe UI (Table 2).

In the multivariable models (Table 3), caffeine intake in the highest quartile(>204 mg/day) was associated with any UI (POR 1.47, 95% CI 1.07, 2.07) after controlling for significant factors (age, race/ethnicity, poverty income ratio, BMI, self-rated health status, major depression, chronic diseases, alcohol use, water intake, total dietary moisture intake, and reproductive factors in women including vaginal deliveries). However, the odds ratio for caffeine intake in the top quartile and *moderate/severe* UI was not significant when vaginal deliveries were included in the model (POR 1.42, 95% CI 0.98, 2.07). When examining the top 10^{th} percentile for caffeine intake, no associations were seen for any UI (POR 1.23, 95% CI 0.70, 2.12) or moderate/severe UI (POR 0.90, 95% CI 0.43, 1.87) when vaginal deliveries were included in the model. Caffeine intake was not associated (p>0.05) in a separate multivariable analysis according to UI type(stress, urge, mixed, or other).

Discussion

Results from the 2005–2006 and 2007–2008 NHANES indicated that among a representative sample of US women aged 20 years and above, the prevalence of any UI was associated with caffeine intake ≥204 mg/day (POR 1.42, 95% CI 1.07, 2.07), even after controlling for other UI risk factors including water and total moisture intake. When evaluating the severity of UI symptoms, no relationship with moderate/severe UI and caffeine intake was found. Types of UI (stress, urge, and mixed UI) were not associated with moderate or high caffeine intake when controlling for other UI risk factors.

Previous cross-sectional studies have reported conflicting findings regarding the relationship of caffeine intake and UI[12–15]. Two large epidemiologic studies reported opposing conclusions about the relationship of caffeine and UI. Dalosso et al found no association between tea or coffee consumption and stress UI or overactive bladder symptoms in the 39,603 male and female participants in the Leicestershire MRC Incontinence Study in the UK [17]. More recently, Jura et al recently reported data from the Nurses' Health Study characterizing measured caffeine intake and the presence of UI[18]. Their conclusion that high caffeine intake(>450 mg/day)was associated (RR 1.3, 95% CI 1.0, 1.8) with frequent UI (≥weekly) and urgency UI (RR 1.42, 95% CI 1.04, 1.95) is similar to our findings that caffeine intake ≥204 mg/day was associated any UI (OR 1.47, 95% CI 1.07, 2.01). We observed a similar trend in the association of caffeine intake with moderate/severe UI, but it did not reach statistical significance in the final multivariable model (POR 1.42, 95% CI 0.98, 2.07). This is likely due to the 42% reduction in the sample size when vaginal delivery is added to the model and results in an increase in the POR, but a widening of the 95% CI to include one (Table 3). Without vaginal deliveries in the model, caffeine intake was associated with moderate/severe UI (POR 1.40, 95% CI 1.10, 1.75).

The study by Jura et al was limited by the lack of ethnic diversity (95% White), and the failure to control for multiple factors known to affect continence (alcohol use, prior hysterectomy, presence of pelvic organ prolapse, number of chronic diseases, and depression). Furthermore, their assessment of fluid intake only included fluid obtained from beverages without data provided about total fluid intake including moisture in foods. Others have previously demonstrated that up to 18% of total moisture intake comes from sources other than beverages [26]. Recent data from the Swedish Twins Registry showed no

association of coffee and tea consumption and UI in twins, but did not account for other sources of caffeine or total fluid intake [16].

In the multivariable model for moderate/severe UI, we found that women with high water intake were less likely to have UI(data not shown in Table 2, POR 0.71, 95% CI 0.55, 0.91). Furthermore, no association was seen with UI and total moisture intake. Due to the cross-sectional design of this study, we are unable to imply causation. An explanation for this finding may be that women with UI symptoms may reduce fluid intake, rather than that increased fluid intake reduces incontinence. However, one small trial evaluating behavioral therapy for the treatment of UI that included increasing fluid intake in women with low fluid intake showed a reduction in UI episodes and amount of urine loss [27].

Based on our findings, moderation of caffeine intake remains a reasonable part of the multi-component treatment approach for UI, but more adequately powered, randomized, controlled trials are needed. Caffeine has been found to have a diuretic effect and may also have an effect on smooth muscle contractions in the bladder. In one case control study, high caffeine intake (>400 mg/day) was associated with detrusor instability on cystometric evaluation [12]. Bryant et al found a 35% reduction in voids per day and 61% reduction in occasions of urgency symptoms after one month of caffeine reduction in a randomized controlled trial [19]. Caffeine reduction may be more important for women with UI who consume higher daily levels of caffeine (1–2 cups of coffee or several glasses or cups of tea or soda daily) than women who consume lower caffeine levels. Prospective studies are needed to guide clinical practice.

Our study is strengthened by the large sample size with a representative population of US women, specifically designed to oversample women in specific racial/ethnic groups and age groups. Also, a validated measure for UI was used to determine the presence and severity of UI symptoms that enabled us to use two UI definitions (any vs. moderate/severe UI). The validated dietary recall methodology from NHANES that allows for measurement of moisture intake from foods is another strength of this study [22]. Finding an association between caffeine intake and UI after controlling for factors, such as age, race, BMI, moisture intake, alcohol use, hysterectomy and vaginal deliveries, that are recognized risk factors for incontinence, strengthens our conclusions as well. A limitation of NHANES data is that it is cross-sectional in design; therefore, although an association between UI and moderate caffeine intake was noted, we are unable to imply causation. Furthermore, our analysis was dependent on self-reported symptoms of UI and caffeine intake. Questions for UI type were not validated and the data was not analyzed according to UI type/severity. We also were not able to account for the type of caffeine consumed or the timing of the caffeine or fluid consumption.

Conclusions

Our findings support the association of higher caffeine intake (≥204 mg/day, the amount in one 8-ounce cup of coffee per day) and urinary incontinence. A decrease in caffeine intake should be discussed in women with any UI.

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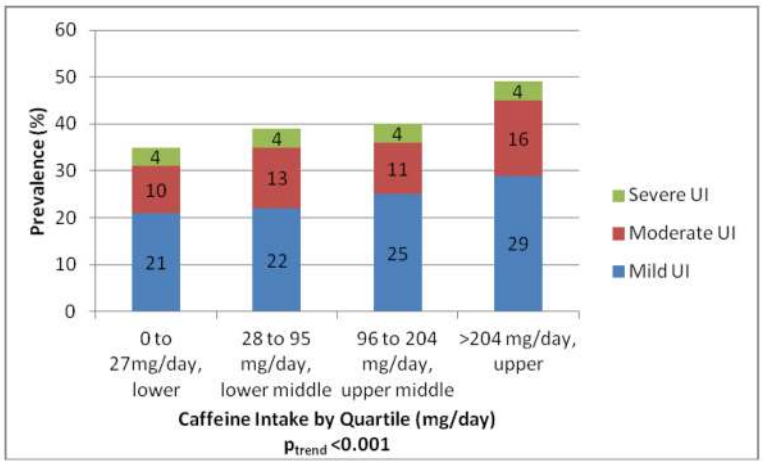

Figure 1.
Prevalence of Urinary Incontinence by Caffeine Quartiles US Women and Severity, data from the National Health and Nutrition Examination Survey 2005–06 and 2007–08

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Table 1

Prevalence Rates of Any Urinary Incontinence and Moderate/Severe Urinary Incontinence Among Women 20 Years of Age and Older in the US, National Health and Nutrition Examination Survey 2005–06 and 2007–08

Variable	N[a]	Any UI Prevalence,[b] % (95% CI)	P value	N[a]	Mod/severe UI Prevalence,[b] % (95% CI)	P value
Age, y	4309		<0.001	4309		<0.001
20–29	798	17.0(14.1,20.4)		798	3.8 (2.5,5.6)	
30–39	711	30.4(26.3, 34.9)		711	10.3 (8.1,12.9)	
40–49	736	45.5 (41.0,50.1)		736	14.2 (11.4,17.6)	
50–59	622	54.5 (48.8,60.2)		622	21.9 (18.0,26.4)	
60–69	700	52.4 (46.8,57.9)		700	23.7 (19.1,28.9)	
70–79	474	48.4 (43.3,53.5)		474	28.7 (23.8,34.2)	
80+	268	51.7 (44.1,59.2)		268	34.7 (28.8,41.4)	
Race/ethnicity	4309		<0.001	4309		0.157
Hispanic-Mexican American	794	39.1 (36.3,42.0)		794	16.5 (14.1,19.1)	
Hispanic–Other	341	33.1 (27.2,39.5)		341	14.2 (10.6,18.9)	
Non-Hispanic white	2108	43.5 (41.1,46.0)		2108	17.2 (15.5,19.1)	
Non-Hispanic black	906	31.1 (27.9,34.5)		906	13.1 (11.2,15.3)	
Other–Including multi-racial	160	36.2 (28.9,44.3)		160	15.5 (9.6,24.2)	
Education	4306		0.547	4306		<0.001
< High school	1140	40.8 (37.8,44.0)		1140	21.5 (19.0,24.2)	
High school or GED	1038	42.2 (38.0,46.6)		1038	17.1 (14.8,19.7)	
>High school	2128	40.6 (38.9,43.1)		2128	14.9 (13.0,16.9)	
Family poverty income ratio	4309		0.042	4309		<0.001
<2	1847	38.4 (35.7,41.1)		1847	19.0 (17.3,20.8)	
≥2	2462	42.3 (39.6,45.0)		2462	15.4 (13.8,17.1)	
Body mass index, kg/m^2	4281		<0.001	4281		<0.001
<25.0	1319	30.4 (27.3,33.7)		1319	10.3 (8.3,12.9)	
25.0–29.9	1244	42.4 (37.9,47.1)		1244	17.9 (15.2,20.9)	
>30.0	1718	50.5 (46.8,54.1)		1718	21.6 (18.4,25.0)	
Self-rated health	4309		<0.001	4309		<0.001

Variable	N[a]	Any UI Prevalence,[b] % (95% CI)	P value	N[a]	Mod/severe UI Prevalence,[b] % (95% CI)	P value
Excellent/very good/good	3304	39.4 (37.1,41.8)		3304	14.7 (13.0,16.5)	
Fair/poor	1005	48.9 (44.4,53.5)		1005	25.6 (22.0,29.6)	
Major depression	4290		<0.001	4290		<0.001
Depression screen <10	3863	39.9 (37.8,42.0)		3863	15.1 (13.7,16.9)	
Depression screen ≥10	427	52.7 (46.7,58.7)		427	31.0 (26.3,36.2)	
Ever Used Female Hormones	4292		<0.001	4292		<0.001
No	3283	36.6 (34.1,39.1)		3283	12.9 (11.5,14.5)	
Yes	1009	53.7 (49.5,57.8)		1009	26.6 (23.0,30.6)	
Vaginal deliveries	2494		<0.001	2494		<0.001
0	618	35.8 (31.5,40.3)		618	10.9 (8.3,14.0)	
1–2	688	39.5 (34.2,45.0)		688	12.6 (10.0,15.8)	
3–4	897	45.9 (41.4,50.4)		897	17.9 (15.6,20.5)	
≥5	291	53.7 (47.7,59.6)		291	28.1 (24.5,36.3)	
Hysterectomy	4304		<0.001	4304		<0.001
No	3298	37.7(35.5,40.0)		3298	13.2 (12.0,14.5)	
Yes	1006	53.1 (48.4,57.7)		1006	28.5 (24.9,32.4)	
Vaginal bulging	4241		<0.001	4241		<0.001
No	4100	40.1 (37.9,42.3)		4100	15.7 (14.2,17.3)	
Yes	141	68.6 (55.1,79.6)		141	43.3 (34.1,53.0)	
Number of chronic diseases	4250		<0.001	4250		<0.001
0	1702	32.5 (29.2,36.0)		1702	9.5 (7.7,11.6)	
1	1145	39.6 (35.4,43.8)		1145	15.5 (12.2,19.5)	
2	754	49.9 (45.3,54.5)		754	22.7 (20.0,25.6)	
3	414	55.0 (48.5,61.4)		414	28.8 (23.9,34.3)	
≥4	235	63.0 (53.8,71.4)		235	36.8 (29.1,45.3)	

[a]Total number of women responding for the category or condition under study (denominator) excluding those with missing data

[b]Weighted prevalence rates reported

Table 2

Univariate analysis for Total Moisture In take, Water Intake, and Caffeine Intake According to Urinary Incontinence Severity Among Women 20 Years of Age and Older in the US, National Health and Nutrition Examination Survey 2005–06 and 2007–08

Variable	N[a]	Any UI Prevalence,[b] % (95% CI)	P value	N[a]	Mod/severe UI Prevalence,[b] % (95% CI)	P value
Total moisture intake in upper quartile (>3319 gm/day)	4309		0.002	4309		0.253
No	2577	26.3 (23.8,28.9)		3486	17.1 (15.5,18.8)	
Yes	1732	21.5 (19.1,24.2)		823	14.6 (11.3,18.7)	
Water intake in upper quartile (≥1304 gm/day)	4309		0.455	4309		<0.001
No	3166	41.4 (38.9,44.0)		3166	18.0 (16.4,19.6)	
Yes	1143	40.0 (36.8,43.3)		1143	12.9 (10.7,15.4)	
Caffeine intake upper quartile (≥204 mg/day)	4309		<0.001	4309		0.005
No	3412	37.8 (35.9,39.8)		3412	15.2 (13.6,16.9)	
Yes	897	49.4 (45.0,53.7)		897	19.9 (17.0,23.1)	
Caffeine intake top 10th percentile (≥348 mg/day)	4309		0.008	4309		0.234
No	3974	39.7 (37.6,41.8)		3974	16.2 (14.7,17.8)	
Yes	335	51.7 (43.3,60.0)		335	19.1 (16.5,31.4)	

[a] Total number of women responding for the category or condition under study (denominator) excluding those with missing data

[b] Weighted prevalence rates reported

Table 3

Unadjusted and Adjusted Step-wise Multivariable Models for Caffeine Intake at the 75th Percentile (≥204 mg/day)

	Cases	Any UI* POR (95% CI)	Moderate/Severe UI* POR (95% CI)
Step 1: Unadjusted	4309	1.60 (1.34, 1.91)	1.38 (1.11, 1.73)
Step 2: Sociodemographics (age, race, education, poverty status)	4306	1.54 (1.30, 1.84)	1.41 (1.15, 1.73)
Step 3: Comorbidity and BMI	4220	1.60 (1.34, 1.92)	1.43 (1.15, 1.80)
Step 4: Depression and Self- rated Health	4205	1.59 (1.33, 1.90)	1.43 (1.14, 1.79)
Step 5: Alcohol use	4204	1.60 (1.36, 1.91)	1.48 (1.18, 1.86)
Step 6: Water and total moisture intake from food and fluid	4204	1.54 (1.28, 1.86)	1.43 (1.13, 1.80)
Step 8: Hysterectomy, hormone replacement therapy	4186	1.53 (1.27, 1.84)	1.40 (1.10, 1.75)
Step 9: Vaginal deliveries	2423	1.47 (1.07, 2.01)	1.42 (0.98, 2.07)

*Separate logistic regression models created for “Any UI” and “moderate/severe UI”