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LONGITUDINAL CHANGES IN OVERACTIVE BLADDER AND STRESS INCONTINENCE AMONG PAROUS WOMEN

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Abstract

AIMS—To describe longitudinal changes in symptoms of overactive bladder (OAB) and stress urinary incontinence (SUI) among parous women.

METHODS—At annual examinations, beginning at least five years from first delivery, OAB and SUI were assessed using the Epidemiology of Prolapse and Incontinence Questionnaire. Published thresholds were used to define “bothersome” symptom scores. The prevalence, the incidence of bothersome symptoms, and treatment rates were calculated. In separate analyses for women who delivered by cesarean versus vaginal delivery, odds of SUI or OAB symptoms (score>0) were modeled as a function of time since childbirth, age, race, and obesity. Among those with persistent symptoms, severity symptom score was modeled as a function of time since childbirth and these same covariates.

RESULTS—1481 participants completed up to 5 annual assessments (2722 woman-years). During follow-up, the incidences of bothersome SUI and OAB were 2.5/100 woman-years and 1.7/100 woman-years, respectively. Although SUI and OAB symptoms were more common in the vaginal birth group ($p<0.001$), the odds of symptoms increased since increasing time from delivery in the cesarean group. Symptom severity did not change substantially over time in either group. Obesity was strongly associated with symptoms related to SUI and OAB.

CONCLUSIONS—Five years from first delivery, symptoms related to SUI and OAB were more common and of greater severity after vaginal than cesarean birth. However, differences between these two groups lessen as time from childbirth increases. Obesity control should be a primary target for reduction of incontinence and incontinence severity among parous women.

Keywords

overactive bladder; stress urinary incontinence; longitudinal cohort study

Introduction

Urinary incontinence, including stress incontinence and overactive bladder, is common among adult women. For example, in 2005 and 2006, a survey conducted by the National Centers for Health Statistics estimated that 16% of adult US women (95% confidence interval, 13.2%–18.2%) suffer from moderate to severe urinary incontinence, defined as monthly leakage of volumes more than just drops or weekly leakage of any volume [1]. Given this prevalence for moderate to severe incontinence, the public health burden of this problem is substantial.

Researchers who study the epidemiology of urinary conditions have used various definitions for stress urinary incontinence (SUI) and overactive bladder (OAB). Some investigations have focused on the presence or absence of relevant symptoms [2], while others have defined a threshold for symptom severity [3, 4]. While both approaches have merit, an advantage of a definition that includes a continuous measure or scale [5] is the opportunity to consider changes in symptom burden across populations and over time.

Epidemiologic evidence [2, 3, 6, 7] suggests that obstetrical events play a central role in the development of incontinence in women. Specifically, most studies suggest that parous women who have experienced at least one vaginal birth are at much higher risk of pelvic floor disorders than those who have delivered exclusively by cesarean [3, 7]. The association between obstetrical history and urinary incontinence appears to be strongest early in life and much weaker among postmenopausal women [2]. However, very little is known about how various obstetrical exposures affect the course and progression of urinary disorders across a woman's lifespan.

In this investigation, we used a life course approach [8] to investigate longitudinal changes in SUI and OAB after cesarean versus vaginal birth. Specifically, the first delivery was considered the origin for longitudinal analysis of changes in urinary symptoms over time. We hypothesized that obstetrical events early in adult life would have long-term effects on the incidence and severity of urinary symptoms later in life. We used data from a longitudinal study of urinary symptoms among parous women, enrolled 5–10 years after first delivery and assessed annually thereafter. The specific goals of this analysis were (1) to describe the prevalence and incidence of SUI and OAB among parous women; (2) to investigate the relative odds of urinary symptoms as a function of increasing time since cesarean or vaginal birth; and (3) to describe changes in the severity of SUI, OAB, and related symptoms over time. These goals reflect the objectives of the parent study, which are to examine factors that influence disease progression, to model the prognosis for women with mild disease, and to understand how symptom severity changes over time.

Materials and Methods

Data for this investigation were derived from the first five years of the Mother's Outcomes After Delivery study (MOAD), a prospective longitudinal cohort study in which parous women were assessed annually for incontinence and other pelvic floor disorders [7]. A primary goal of the MOAD study is to describe and compare the incidence of pelvic floor

disorders between parous women with and without a history of vaginal delivery. Women are eligible to enroll in MOAD 5 to 10 years after first delivery. Recruitment methods, selection criteria, and exclusion criteria have been previously described [7]. Specifically, approximately half of the women who were contacted about this study agreed to participate and participation did not differ by cesarean versus vaginal birth [7]. Enrollment began late in 2008 and continued over the first five years of the study. Thus, at the time of analysis, a participant might have participated in the study for as few as one annual assessment or as many as five annual assessments.

For the MOAD study, urinary symptoms are assessed annually using the Epidemiology of Prolapse and Incontinence Questionnaire (EPIQ) [7]. This instrument is designed to identify and quantify the severity of pelvic floor disorders in community populations. This questionnaire resulted from NIH-supported research and has been rigorously validated [5]. In particular, test-retest reliability of items related to urinary incontinence and related bother has been good to excellent (correlations greater than 0.70) [5]. The EPIQ includes questions designed to capture presence and severity of urinary symptoms. From these questions, summary scores were calculated for SUI and OAB. The SUI summary score was derived from two symptoms (urine leakage related to activity, coughing, or sneezing; and small amounts of urine leakage (drops)) and two impact items (feeling frustrated by urine leakage and impact of incontinence on physical recreation such as walking, swimming, or other exercise). The OAB summary score was derived from five symptoms (frequent urination; the need to rush to the bathroom to prevent leakage of urine; the need to get up at night to empty your bladder; frequency of daytime urination, and urine leakage related to a feeling of urgency).

Each EPIQ item includes a stem question (for example, “Do you experience urine leakage related to a feeling of urgency?”) and a bother score (on a visual analogue scale from zero, indicating no bother, to 100, indicating maximum bother). Per the design of the EPIQ, only participants who answer “yes” to a given stem question are asked to rate the related bother. Women who deny a specific symptom are assigned a bother score of 0. Thus, EPIQ symptoms are rated from 0 (indicating either the absence of the symptom or no bother related to the symptom) to 100 (indicating the highest possible bother related to the symptom). One exception to this question design is the item for ‘frequency of daytime urination’. Because it is presumed that all respondents urinate at least once in the daytime, all respondents are asked to provide a bother score for ‘frequency of daytime urination’.

The SUI and OAB summary scores are the averages of the respective items in each score and are therefore also scored from 0 to 100. Validation studies [5] indicated that an OAB threshold score of >59.6 maximized the positive predictive value for identifying women with clinically significant symptoms of OAB (sensitivity 77, specificity 90). Similarly, an SUI threshold score of 47.3 was optimal for identifying women with clinically significant symptoms of SUI (sensitivity 80, specificity 92). Thus, using the EPIQ SUI summary score, women can be divided into those without any symptoms (summary score =0), those with highly bothersome SUI symptoms (summary score >47.3), and an intermediate group with low symptom bother (summary score greater than zero but less than 47.3). A similar classification can be used to describe OAB.

Using this classification, we estimated the annual incidence of highly bothersome SUI and OAB. Women were also asked annually whether they had received treatment for urinary problems, including surgery, medications, or supervised physical therapy. Using these data, we estimated the treatment rate, defined as the number of treatments initiated during the follow up period per woman-years of observation.

A second goal of this study was to investigate the relative odds of urinary symptoms as a function of increasing time since first delivery and attained age. For these analyses, we considered individually the outcome of answering 'yes' to each of the six SUI and OAB stem questions contributing to the respective summary scores (urine leakage related to activity/coughing/sneezing; small amounts of urine leakage (drops); frequency; nocturia; urgency; and urgency incontinence). To account for the repeated outcome measures from a given participant, we used generalized estimating equations to model the log odds of reporting 'yes' to each symptom as a function of time since five years after first delivery (e.g., because women are not recruited to the MOAD study until at least 5 years from first delivery). In subscribing to this biological time scale, we hereafter refer to the time of 5 years from first delivery as 'baseline'. The combination of age at first delivery and years since delivery results in age attained at the current visit. To reflect the longitudinal analysis employed herein, the axis of time is described in years since delivery. Methods to describe the effects of exposures of interest, as well as the multiple axes of time, were employed to create a graphic description of symptom prevalence over time. Covariates in the model included age at first delivery, current obesity (defined as BMI ≥ 30 kg/m²), and race (black vs. non-black). Previously [7], our group demonstrated that urinary symptoms, especially those related to stress incontinence, are significantly more common among women who have experienced at least one vaginal birth (versus delivery by cesarean exclusively). Therefore, analysis was stratified by delivery history (those who have experienced at least one vaginal birth versus those who have delivered only by cesarean) to assess the heterogeneity of temporal patterns and association of covariates by delivery history on the respective outcomes.

Our final objective was to investigate how (among women indicating a given symptom) symptom severity changed over time. For these analyses, we considered the bother score for each of the six specific symptoms as well as the SUI and OAB summary scores. Exploratory analysis of the data showed that the majority of women who reported a given symptom did so consistently over follow-up. Therefore, analysis was restricted to women who consistently reported the symptom at all attended study visits as well as women who did not report the symptom at enrollment but subsequently developed the symptom and reported it consistently thereafter. For the latter group of women, only data from study visits at which symptoms were reported were included in analysis. The mean symptom score was modeled as a function of time (years since five years after first delivery), age at first delivery and current obesity. Because these analyses were restricted to women who reported the symptom in question, the sample size was not sufficient to assess the impact of race. Again for this analysis, women who had delivered vaginally were considered separately from those who had delivered exclusively by cesarean.

All analyses were performed using SAS statistical software version 9.3 (© 2002–2010, SAS Institute Inc, Cary, NC). Statistical significance was assessed at the $\alpha=0.05$ level.

Results

At the time of this analysis, 1497 women were enrolled in this study. Sixteen women were excluded due to missing data for race, BMI, age, delivery status, or total parity. Table I provides the descriptive statistics for 1481 women included in this analysis. Only thirteen women reported an additional delivery during the follow up period. Compared to the 728 women with at least one vaginal birth, the 753 women who had only delivered by cesarean had higher frequencies of obesity and primiparity.

The number of annual surveys completed at the time of this analysis was 5 for 130 women (9%), 4 for 346 women (23%), 3 for 300 women (20%), 2 for 357 women (17%) and one for 348 women (23%), and they spanned 2722 woman-years. Given that women were enrolled during each year of the study, those with fewer annual surveys were largely those who were enrolled toward the end of this period. Women with one visit versus 2–3 visits versus 4–5 visits were not different at the time of enrollment with respect to body habitus, parity, and the urinary symptoms of interest.

During follow-up, the incidence of highly bothersome OAB was 1.7/100 woman-years and the incidence of highly bothersome SUI was 2.5/100 woman-years. Treatment during follow-up included 13 women treated for incontinence with medication (0.48 per 100 person-years), 12 surgeries (0.44 per 100 person-years), and 13 instances in which a woman began a supervised program of pelvic muscle rehabilitation (0.48 per 100 person-years). Symptoms were not necessarily resolved after treatment. Due to the small number of treated women and to the absence of a clear effect on symptoms, incident treatments were not considered separately in our analyses.

Using the summary scores to define highly bothersome SUI and OAB, we estimated the prevalence of these conditions five years from delivery in a reference group (30 years old at first delivery, non-obese, non-black race). Among women in this reference group, the prevalence of highly bothersome SUI was 2.3% among women who had delivered by cesarean delivery and 14.2% after at least one vaginal birth (p for difference <0.001). The prevalence of highly bothersome OAB was 1.4% in the cesarean group and 6.0% in the vaginal birth group (p for difference <0.001).

Table II provides a comprehensive analysis of the prevalences of individual symptoms between the vaginal and cesarean delivery groups. Women in the vaginal birth reference group (e.g., 5 years from first delivery, maternal age 30 years at first delivery, non-black and non-obese) were significantly more likely than those in the cesarean birth reference group to report urine leakage related to activity/coughing/sneezing ($p<0.01$); small amounts of urine leakage ($p<0.01$); frequency ($p<0.01$); urgency ($p<0.01$); and urgency incontinence ($p<0.01$). There was no significant difference between the birth groups in the prevalence of nocturia ($p=0.43$).

Table II also describes the relative odds for each symptom with increasing time since first delivery. The models described in table II are also graphically depicted in Figure 1, with the prevalence of each symptom illustrated as a function of both years since delivery and attained age. For the first three symptoms in Table II, depicted in the upper three panels of Figure 1, it can be seen that the difference between vaginal and cesarean groups lessen with age and time since first delivery. Specifically, among women who had delivered exclusively by cesarean, the odds of leakage with activity/coughing/sneezing increased 6% per year after first delivery (odds ratio 1.06, 95% confidence interval (CI) 1.01, 1.11). In contrast, the odds of this symptom did not increase over time for women with a history of at least one vaginal birth (difference in relative odds, $p=0.014$). In both birth groups, the relative odds of urinary urgency (the need to rush to the bathroom for urination) increased significantly with increasing interval from first birth (1.07 per year in the cesarean group and 1.06 in the vaginal birth group). The relative odds for the other symptoms did not increase significantly over time from first delivery, although there was a trend toward increasing symptoms among women who had delivered by cesarean (e.g., relative odds >1 for all six symptoms). Obesity was also noted to be a powerful risk factor for all symptoms considered, especially in the cesarean birth group. Due to small sample sizes, not shown in table II is the impact of black race, which was associated with a reduced odds of leakage related to activity/coughing/sneezing in both groups (odds ratio 0.52 (95% CI: 0.34, 0.82) for the cesarean group and 0.34 (95% CI: 0.21, 0.53) for the vaginal birth group) but with increased odds of urgency (odds ratio 1.80 (95% CI: 1.17, 2.79)) and urgency incontinence (odds ratio 1.99 (95% CI: 1.31, 3.02)) in the cesarean birth group. In addition, we also controlled for parity in both groups but found no substantial changes in the inferences described in table II.

Attained age is not explicitly represented in table II. However, attained age is the arithmetic sum of age at first birth and time since first birth. Therefore, the coefficient of age at first delivery (as shown in table II) is equivalent to the coefficient for attained age. Thus, it follows from table II that assuming years since delivery is held constant, all symptoms tend to increase with increasing age for women in both of the birth groups.

Table III shows, by delivery type, the mean change in bother score for each urinary symptom among women who consistently reported the presence of each symptom. In the reference group (i.e., five years after first delivery, age at first delivery = 30 years, non-obese), mean bother scores were higher (indicating a greater degree of bother) in the vaginal birth group, controlling for age at first birth, years since first birth, and current obesity. For example, the mean estimated bother score for leakage with activities, five years after first birth, was 44.7 for the cesarean group and 59.4 for the vaginal group (assuming non-obese and age at first delivery is 30 years) ($p=0.003$). Significant differences in mean bother scores were also observed between the vaginal and cesarean groups for small amounts of urine leakage (drops) ($p=0.048$), the need to rush to the bathroom to prevent leakage of urine ($p=0.039$), and urine leakage related to a feeling of urgency ($p=0.002$). No significant differences were noted between the vaginal and cesarean reference groups for bother score related to frequency or nocturia. Obese women had significantly higher mean bother scores, especially for leakage with activity. Notably, mean bother scores did not increase with increasing interval from first birth. In fact, for some symptoms, mean scores decreased over time in the vaginal birth group. For example, the mean bother score for leakage related to a

feeling of urgency decreased almost 2 points for every 1-year increase in the interval from delivery. A similar pattern was noted for the SUI and OAB summary scores.

Discussion

Vaginal childbirth is an important risk factor for urinary symptoms, especially symptoms related to stress urinary incontinence. Parous women are more likely to report urinary symptoms, especially stress urinary incontinence, after vaginal versus cesarean birth [3, 7]. However, the present study suggests that the added risk associated with a vaginal delivery may diminish over time. Among women who delivered by cesarean, we observed an increasing odds for urinary symptoms with each year since first delivery. This was especially true for the symptom of leakage with activity/cough/sneeze. This increase over time was not observed among women who had delivered vaginally. Thus, differences between the vaginal and cesarean groups lessen over time. We speculate that vaginal birth promotes 'early onset' SUI, rather than an increase in the lifetime prevalence of this condition. This hypothesis would be consistent with a cross-sectional study of older women which found similar patterns of urinary incontinence after age 65 between women with a history of cesarean versus vaginal birth [2].

Among women who consistently reported a urinary symptom, bother scores were significantly higher after vaginal birth than cesarean. For example, controlling for time since first delivery, age at first delivery and obesity, the mean bother score for urinary leakage related to activity was 25% lower in the cesarean group compared to the vaginal birth group. However, we were surprised to find very little change in mean bother scores over time (e.g., with increasing interval from first birth). In fact, the bother score for some urinary symptoms (leakage of "drops", urgency, and urgency incontinence) declined 1–2 points per year among women with a history of vaginal birth. We speculate that the observed decrease in bother score might be because women become more tolerant of chronic symptoms as they age. However, it is unclear whether this trend is clinically significant. A critical question is whether the observed pattern is sustained over longer periods. Moreover, the present study considered <5 years of observation and this duration of observation may not be sufficient. Indeed, Donaldson and colleagues [9] followed a sample of women for four years. Although they failed to see a significant change in severity score over four years for individual women (especially for SUI), they observed significant cross-sectional differences in severity across age groups (ranging from 40–49 years to >80 years). This suggests that changes in incontinence severity may evolve slowly (e.g., over decades). Additional follow up of our enrolled participants will provide insights and will help us to identify characteristics associated with changes in bother score over more extended periods of time.

Another important finding from this study is that obesity is a powerful risk factor for urinary symptoms and for symptom severity. For example, obese women were significantly more likely to report leak with activity/cough/sneeze than women of normal weight, particularly in the cesarean group. Also, obesity increased the severity of bother among symptomatic women. In general, these findings suggest the importance of obesity control as a strategy for reduction of incontinence and incontinence severity among parous women.

Strengths of this study include the relatively large sample size, the use of a validated symptom measure, and the opportunity to follow a population longitudinally (annually). In addition, while other researchers have focused either on the presence versus absence of relevant symptoms or a binary measure of severity among those with symptoms, the longitudinal analyses presented here are congruent with the nature of the outcome as a mixture of both. A limitation is that our study did not include an objective measure of incontinence. However, patient-centered outcomes are increasingly used as an outcome in incontinence studies [9, 10, 11]. Another possible limitation of this study is that the trends observed may be relevant only to a certain period in women's lives, such that these trends might not be sustained later in life. Additional follow up of this cohort will clarify whether changes are observed as the population ages.

Conclusions

This study suggests a substantial impact of vaginal delivery on the presence and on the severity of urinary symptoms, especially 5 years from delivery. However, over the subsequent 5 years, the odds for urinary symptoms increase annually among those who delivered by cesarean, especially for symptoms related to SUI. Thus, rates of stress incontinence among women delivering exclusively by cesarean may converge with those who delivered vaginally as time from childbirth increases. Our results also demonstrate that obesity is an important risk factor for bladder symptoms and therefore obesity control should be a primary target for reduction of incontinence and incontinence severity among parous women.

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Figure 1.

Estimated changes over time in prevalence of six symptoms: (a) urine leakage related to activity, coughing, or sneezing; (b) small amounts of urine leakage (drops); (c) frequent urination; (d) the need to get up at night to urinate; (e) the need to rush to the bathroom to prevent leakage of urine; (f) urine leakage related to a feeling of urgency. For each symptom, separate estimates are presented for each of four groups, according to birth history (cesarean/ vaginal) and presence/absence of obesity. Estimates are derived from multivariate generalized estimating equation logit models. Each curve reflects prevalence for a reference group of non-black women whose first delivery occurred at age 30. Two axes of time are shown: attained age (top axis) and years since first delivery (bottom axis).

Table I

Descriptive statistics (median [interquartile range] or % (n)) of 1481 women, by delivery type.

Characteristic	Cesarean delivery only (N=753)	At least one vaginal birth (N=728)
Maternal Age, years		
At 1 st delivery	31 [28, 35]	31 [28, 35]
Years from first delivery to study enrollment	6.5 [5.6, 8.2]	6.4 [5.5, 8.1]
Body mass index at enrollment		
Normal (< 25 kg/m ²)	40% (499)	55% (391)
overweight (25 – 30 kg/m ²)	25% (189)	30% (215)
obese (> 30 kg/m ²)	35% (265)	17% (122)
Parity at enrollment		
1	31% (238)	24% (173)
2	55% (412)	57% (418)
3 or more	14% (103)	19% (137)
Black race	18% (137)	13% (92)

Table II

Baseline prevalence[†] of each urinary symptoms and relative odds* (with 95% confidence interval) for each urinary symptom, by delivery type

Symptom	Cesarean delivery only (2143 observations among 753 women)				At least one vaginal birth (1853 observations among 728 women)			
	Baseline prevalence [†]	Relative odds per year since first birth	Relative odds per year increase in maternal age at first birth	Relative odds for obesity (compared to non-obese)	Baseline prevalence [†]	Relative odds per year since first birth	Relative odds per year increase in maternal age at first birth	Relative odds for obesity (compared to non-obese)
Leakage related to activity, coughing, or sneezing	20%	1.06 (1.01, 1.11)	1.02 (0.99, 1.05)	2.47 (1.81, 3.37)	54%	0.98 (0.93, 1.02)	1.03 (1.00, 1.06)	1.47 (1.02, 2.12)
Leakage of “drops”	17%	1.04 (0.99, 1.09)	1.02 (1.00, 1.05)	2.51 (1.86, 3.37)	37%	0.97 (0.93, 1.02)	1.05 (1.02, 1.08)	1.27 (0.88, 1.82)
Frequent urination	17%	1.04 (0.99, 1.10)	1.01 (0.98, 1.04)	1.67 (1.21, 2.30)	27%	0.98 (0.94, 1.04)	1.02 (0.99, 1.05)	1.20 (0.81, 1.77)
Nocturia	43%	1.02 (0.97, 1.06)	1.02 (1.00, 1.05)	1.62 (1.22, 2.14)	43%	1.01 (0.97, 1.06)	1.02 (0.99, 1.05)	1.43 (1.00, 2.04)
Need to rush to the bathroom for urination	7%	1.07 (1.00, 1.14)	1.05 (1.01, 1.09)	2.89 (2.00, 4.17)	17%	1.06 (1.00, 1.11)	1.04 (1.01, 1.08)	1.28 (0.85, 1.94)
Leakage related to a feeling of urgency	7%	1.04 (0.98, 1.11)	1.05 (1.01, 1.08)	2.63 (1.83, 3.78)	17%	1.03 (0.97, 1.09)	1.06 (1.02, 1.09)	1.33 (0.87, 2.04)

[†] Estimated prevalence for reference group, defined as 5 years from first delivery, 30 years old at first delivery, non-obese body mass index, and non-black race.

* Relative odds and 95% confidence intervals derived from multivariate generalized estimating equation logit models with empirical covariance matrix and exchangeable working correlation to account for repeated measures. Models control for age at first delivery, body mass index (obese vs. non-obese), and race (black versus non-black).

Table III

Mean change in bother score (with 95% confidence interval) for each urinary symptom among women who consistently reported each symptom, by delivery type.

Symptom	Cesarean delivery only				At least one vaginal birth			
	Baseline score*	Change in score per year since first birth	Difference in score per year increase in maternal age at first birth	Difference in score for obesity (compared to non-obese)	Baseline score*	Change in score per year since first birth	Difference in score per year increase in maternal age at first birth	Difference in score for obesity (compared to non-obese)
Leakage related to activity, coughing, or sneezing (n=532) [†]	44.7 (36.3, 53.0)	0.03 (-1.4, 1.5)	0.2 (-0.7, 1.0)	13.2 (4.4, 22.0)	59.4 (54.6, 64.3)	-0.7 (-1.7, 0.4)	-0.6 (-1.4, 0.1)	6.6 (-1.8, 15.0)
Leakage of "drops" (n=400) [†]	45.1 (36.0, 54.2)	-0.8 (-2.4, 0.9)	-0.2 (-1.1, 0.7)	13.1 (4.0, 22.2)	56.0 (50.0, 62.1)	-1.6 (-3.0, -0.2)	-0.9 (-1.7, -0.1)	10.5 (0.6, 20.3)
SUI summary score (n=852) [†]	12.7 (9.4, 16.1)	0.6 (0.0, 1.2)	0.2 (-0.1, 0.6)	9.3 (5.5, 13.0)	25.9 (23.1, 28.7)	-0.4 (-1.0, 0.2)	-0.1 (-0.5, 0.3)	6.9 (1.8, 12.0)
Frequent urination (n=347) [†]	49.7 (41.6, 57.7)	-1.0 (-2.4, 0.4)	0.5 (-0.3, 1.2)	8.7 (0.4, 16.9)	52.8 (46.6, 59.0)	0.1 (-1.3, 1.6)	-0.2 (-1.0, 0.6)	2.3 (-7.6, 12.3)
Nocturia (n=689) [†]	38.9 (33.3, 44.5)	-0.6 (-1.6, 0.4)	0.5 (-0.1, 1.1)	6.7 (0.4, 13.0)	44.7 (39.5, 50.0)	-0.6 (-1.8, 0.5)	-0.4 (-1.1, 0.3)	11.8 (3.4, 20.3)
Need to rush to the bathroom for urination (n=263) [†]	49.0 (38.4, 59.6)	0.8 (-0.9, 2.5)	-0.3 (-1.2, 0.5)	9.7 (-0.2, 19.6)	62.1 (55.3, 68.9)	-1.5 (-3.0, 0.1)	-0.6 (-1.5, 0.3)	6.2 (-4.3, 16.6)
Leakage related to a feeling of urgency (n=243) [†]	42.6 (30.0, 55.2)	1.0 (-1.1, 3.1)	0.1 (-1.0, 1.2)	13.5 (1.2, 25.8)	65.2 (57.5, 72.9)	-1.6 (-3.4, 0.1)	-0.6 (-1.6, 0.4)	11.3 (-0.8, 23.5)
OAB summary score (n=1159) [†]	12.7 (10.2, 15.1)	0.0 (-0.4, 0.5)	0.3 (0.0, 0.6)	9.3 (6.2, 12.5)	18.9 (16.4, 21.4)	-0.1 (-0.6, 0.4)	0.1 (-0.2, 0.5)	6.4 (1.9, 11.0)

* Baseline mean score (95% CI) for reference group women: 5 years from first delivery, first delivery at 30 years, and non-obese body mass index.

[†] For each individual symptom, the "n" represents the number of women who reported the symptom at every annual assessment or developed the symptom during follow up and subsequently reported the symptom at every annual assessment. For the SUI and OAB summary score, the "n" represents the women who had a summary score >0 at every annual assessment or developed the symptom during follow up and subsequently reported the symptom at every annual assessment.