Influence of maternal weight on the new onset of stress urinary incontinence in pregnant women

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ABSTRACT

Introduction and Hypothesis: The aim of the study was to investigate the incidence and severity of stress urinary incontinence (SUI) in primigravid women at term and its association with maternal body weight.

Methods: This was an observational study of 458 primigravid women who came to give birth at Donostia Hospital during 2007**.** Urinary symptoms were investigated (2002 ICS definitions) and a physical examination including height, weight, pelvic floor muscle strength and fetal presentation was performed. We calculated the incontinence severity index (ISI) and the women answered the ICIQ-UI-SF questionnaire.

Results: SUI affected 139 (30.3%) primigravid women. The ISI distribution was: 40.3% slight, 54.7% moderate, 4.3% severe and 0.7% very severe. Pregnant women at term with body weight ≥75 kg appear to have more than double the risk of presenting SUI.

Conclusions: The incidence of SUI is high in pregnancy. Increased maternal body weight at term is an independent risk factor for incontinence.

Key words: Body weight; Pregnancy; Stress urinary incontinence; Risk factors.

BRIEF SUMMARY

The influence of maternal body weight in the development of stress urinary incontinence in pregnancy is analyzed in primigravid women at term.

INTRODUCTION

Stress urinary incontinence (SUI) is a common problem in pregnancy. The prevalence rate during the final weeks of gestation is reported to be between 28% and 48% [1–8]. This problem appears more serious if we consider that these women are more at risk of being incontinent not only in the postpartum period but also later in their life. Burgio et al [9] followed 523 women after delivery and observed that being incontinent during pregnancy doubled the odds of urinary incontinence one year later. Vickrup et al [10] found that the presence of SUI during first pregnancy was a strong predictor of SUI symptoms twelve years later.

In spite of this high prevalence, the causes of gestational incontinence are still unclear. It has been suggested that it could be the consequence of local tissue changes. There are two theories which attempt to explain these changes. The first involves hormones such as relaxin, that is thought to have a connective tissue remodeling effect [11] and may be involved in the modifications that prepare the female pelvis for delivery. The other theory speculates that the tissue changes could be secondary to the mechanical pressure of the enlarging uterus on the bladder and the pelvic floor. Hvidman et al [12] failed to find support for this theory, when looking for an association between urinary incontinence and increased birth weight.

There are only a handful of studies that focus on analyzing the risk factors involved in urinary incontinence during pregnancy. Those variables such as age, parity and body weight that have a recognized association with urinary incontinence (UI) in non pregnant women have been considered [13–15]. Some studies indicate that multiparous women are more likely to have urinary incontinence during pregnancy than nulliparous [4,6,16]. Others have demonstrated an association between urinary incontinence and increased age [6,17]. The influence of maternal body weight is less clear. It is believed that the added weight of pregnancy may bear down on the pelvic tissues, causing stretching and weakening of the different structures of the pelvic floor [18]. Wesnes et al [6] reported that the prevalence of incontinence in pregnancy increased with increasing body mass index (BMI), Hvidman et al [12] also revealed an association between BMI and urinary incontinence. On the other hand, Chiarelli et al [19] and Scarpa et al [16] were not able to find any such association. These studies included both nulliparous and parous women when analyzing the relationship between

weight and incontinence. It is obvious that parous women will have already been subjected to pelvic floor trauma during previous pregnancies and deliveries. This can be avoided if we include only primigravid women in the analysis. To our knowledge, there are no published studies investigating the influence of maternal weight in the incidence of SUI in pregnancy, that include only primigravid women.

The aim of the study was to investigate the incidence and severity of SUI in pregnant women at term and its association with body weight. We hypothesized that increased maternal weight might play a role in the development of SUI in pregnancy.

MATERIAL AND METHODS

The study group was selected from the primigravid women, who came to give birth at Donostia Hospital from April to October 2007. Our aim was to study only new cases of SUI, so those women who made reference to any kind of urinary incontinence before pregnancy were excluded from the study. Other exclusion criteria were: multiple pregnancy, gestational age of less than 37 weeks, maternal history of preexisting diabetes mellitus, previous urogynecological surgery, urogynecological malformations and neurological disorders.

We used the 2002 ICS definitions [20] when interviewing the women about urinary symptoms: urinary incontinence was defined as "the complaint of any involuntary leakage of urine"; SUI was defined as "the complaint of involuntary leakage on effort or exertion, or on sneezing or coughing" and urge urinary incontinence (UUI) was defined as "the complaint of involuntary leakage accompanied by or immediately preceded by urgency".

The diagnosis of new onset of SUI was based on symptoms. It was applied when a woman answered "yes" to the SUI question, once we had ruled out the presence of urinary incontinence prior to pregnancy. The pregnant women with SUI, were asked about frequency and amount of leakage, in order to calculate the four-level incontinence severity index (ISI) developed by Sandvik et al [21]. This index is calculated by multiplying the reported frequency (four levels) by the amount of leakage (three levels). The four levels of frequency and the value of each one are as follows: less than once per month (1), a few times a month (2), a few times a week (3), or every day and/or night (4). The three levels of the amount of leakage and the values are: Drops (1), small splashes (2), or more (3). The resulting index value (1–12) is further categorized into slight (1–2), moderate (3–6), severe (8–9) and very severe (12). The Spanish version of the severity index has been validated against a 24-hour pad-weighing test [22]. All the incontinent women were also asked to complete the validated Spanish version of the questionnaire ICIQ-UI-SF [23]. This condition-specific questionnaire measures the symptoms and impact of incontinence on quality-of-life [24].

To investigate the risk factors associated with pregnancy SUI, we analyzed the following variables: maternal age; maternal height; maternal weight at the beginning of pregnancy; maternal weight at term and weight gained during pregnancy; gestational age at

inclusion; fetal presentation; strength of pelvic floor contraction on admission; diagnosis of urinary tract infection during pregnancy; and birth weight.

All the women underwent a standardized physical examination on inclusion, including measurement of height and weight, evaluation of pelvic floor muscle function and fetal presentation. The strength of pelvic floor contraction was assessed using a perineometer (Peritron®) measuring the strongest of three voluntary pelvic floor contractions, as has been reported previously [25].

Maternal weight gain was calculated by the subtraction of maternal weight at term and the reported weight at the beginning of pregnancy. BMI was calculated as weight in kilograms/(height in meters)^2. Diagnosis of urinary infection was made when there was a positive culture in any of the routine urine samples taken in pregnancy. Birth weight was obtained after delivery from the clinical charts.

All the patients included in the present study were informed before enrolment and gave their consent. The study protocol was approved by the Donostia Hospital Medical Ethics and Investigation Committee.

Statistical analysis of the data:

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) (version 15.0 for Windows).

Correlation of clinical and demographic characteristics with the development of SUI during pregnancy was examined by comparison of means (Student's t-test, ANOVA) and percentages (Chi-square and Fisher test). A multiple logistic regression model was performed with the statistically significant variables, in order to assess the relationship between SUI and the variables described above. Statistical significance was set as p=0.05 throughout.

RESULTS

During the study period, 479 pregnant women at term who came to give birth in Donostia Hospital were interviewed. A total of 21 (4.4%) complained of urinary incontinence prior to pregnancy and were consequently excluded. The remaining 458 formed the study group. The mean age was 30.8 years (range 18–43), the mean BMI was 28.0 (range 20.0–48.3) and the mean gestational age at assessment was 278 days (range 259–301).

SUI affected 139 (30.3%) pregnant women at term. Ten (2.2%) women also had symptoms of UUI. The incontinence severity index distribution was: 56 (40.3 %) slight, 76 (54.7%) moderate, 6 (4.3%) severe and 1 (0.7 %) very severe. Five of the six women with severe ISI had mixed symptoms. The one patient in the very severe ISI group stated that she had suffered from SUI from the beginning of pregnancy. The mean score on the ICIQ-SF-UI questionnaire was 7.31 (range 2–18).

The result of the univariate analysis performed to correlate SUI with different variables is showed in table 1. We excluded 79 continent and 35 incontinent women from the pelvic floor contraction strength evaluation because they were in an active phase of labour and the accuracy of the results would have been questionable. The influence of maternal weight was first evaluated by comparing the means between continent and incontinent women and observing statistical differences (table 1). Afterwards, weight was categorized into two groups: < 63 kg and ≥ 63 kg for weight at the beginning of pregnancy; and < 75 kg and ≥ 75 kg for weight at term. Gestational age was also categorized as follows: < 279 days and ≥279 days. These cut-off points were selected because these were the values that indicated greater differences between the groups.

A multiple logistic regression model was performed to evaluate the independent association between maternal weight and SUI. Maternal weight at the beginning of pregnancy, maternal weight at term, gestational age and occurrence of any urinary infection were included. This analysis indicated that pregnant women with body weight at term ≥75 kg appear to have more than double the risk (odds ratio: 2.09; 95% confidence interval: 1.09–3.99) of developing SUI during pregnancy. We did not find any statistical association with the other variables (table 2).

DISCUSSION

The present study indicated that increased body weight is an independent risk factor for stress urinary incontinence during pregnancy. It also showed a high cumulative incidence of SUI in primigravid women at term with low severity of symptoms. The incidence and prevalence of SUI in pregnancy have been reported in previous works. The published rates vary widely, probably because of methodological differences between the studies. When a self-administrated incontinence questionnaire is used for the diagnosis, the reported rates tend to be higher. The stage of pregnancy at which the diagnosis of incontinence was recorded may also play a role. It is well known that the cumulative incidence of SUI in pregnancy increases with gestational age [1,5,19,26]. A large population-based survey in Norway, the MoBa study [6], using a self-administrated questionnaire, indicated a prevalence of SUI symptoms of 42.6% among nearly 20,000 nulliparous women in the 30th week of pregnancy. A similar prevalence rate was published using the Urogenital Distress Inventory (UDI) [5]. We performed personal interviews on urinary symptoms to ascertain the diagnosis of SUI. Our results agree with the data published by other authors who used the same method. Chaliha et al [3] reported an SUI prevalence rate of 35.7 % in nulliparous women in the third trimester and Viktrup et al [2] indicated a prevalence rate of 32.1% in nulliparous pregnant women at term.

The most important finding of this study is that increased body weight in pregnant women at term is an independent risk factor for stress urinary incontinence during pregnancy. The influence of maternal weight in pregnancy urinary incontinence has been studied before. Wesnes et al [6] reported that the prevalence of incontinence in pregnancy increased with increasing BMI. They considered the weight in the 30th week of pregnancy and included both nulliparous and parous women. Hvidman et al [12] indicated that a BMI ≥30 after delivery correlated with prevalence of urinary incontinence during pregnancy. In contrast, Scarpa et al [16] were not able to find any such association when they considered BMI ≥30 in the third trimester of pregnancy. Neither did Chiarelli et al [15] when they analyzed the association between BMI at term and SUI prevalence during the final month of pregnancy. The main distinguishing characteristic of the present study is that it was designed with the aim of evaluating risk factors of SUI in pregnancy, which is why only new cases were included.

Another important difference is that only primiparous women were included in order to avoid the possible effects of previous pregnancies and deliveries on the continence mechanism. Finally, previous studies in this field used questionnaires to detect SUI, and one of the strength of this study is that it involved face-to-face interviews.

The results also indicated that in the majority of pregnant women, the severity of urinary incontinence was slight or moderate, i.e. no more than leakage of drops, or moderate leakage that happens no more than a few times a week. We also observed that the impact of leaking urine on women's everyday life was low. These facts have been pointed out before [6, 7, 8] and may explain why the majority of incontinent pregnant women do not raise their problem with healthcare professionals. Burgio et al [17] indicated that the most common reasons for not telling doctors about incontinence were that the women thought it was normal, they were not bothered about it or they thought it could not be helped. The truth is that pregnancy SUI is not assigned the importance it should be, considering its association with SUI later in life.

The results of this study may be limited due to the symptom-based definition of SUI. The pregnant women were included when they came to give birth at the hospital and some of them were in the active phase of labor, so it was not possible to perform an adequate stress test in all cases. This was also the reason why the validated incontinence severity index was used rather than a pad test to assess the severity of incontinence. Another limitation of the study design was that constitutional risk factors of SUI such as antenatal bladder neck mobility could not be evaluated. It has been published [8] that primiparous women with postpartum SUI have significantly greater antenatal bladder neck mobility than those women who are continent postpartum. Finally, we were not able to perform an adequate evaluation of other factors involved in urinary incontinence such as maternal age. The inclusion of only primigravid women narrowed the age range and limited evaluation of this variable.

Despite these limitations, this investigation has recorded a high incidence of SUI in first-time pregnancy and, which is even more relevant, it demonstrates an association between increased body weight and SUI in pregnant women. This is a risk factor that can easily be modified and could be used as a starting point for prevention of urinary incontinence based on behavioral modifications during pregnancy. We have confirmed the hypothesis that increased

maternal weight plays a role in the development of SUI during pregnancy. It remains to be seen whether weight reduction or restriction during pregnancy will result in a lower incidence of SUI. Future research is also needed to investigate the mechanism involved in the association between maternal body weight and SUI. It has been suggested that the added weight of pregnancy may modify the various structures of the pelvic floor, but the link between these changes and SUI is still unknown.

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Table 1. Results of the univariate analysis performed to associate SUI with different variables

		Stress Urinary Incontinence		*p value*
		No (n=319)	Yes (n=139)	
Maternal age (years)	mean, SD	30.9 ± 3.7	30.6 ± 4.2	0.51
Gestational age (days)	mean, SD	278.6 ± 9.4	279.6 ± 10.1	0.31
Maternal weight at the beginning of pregnancy (kg)	mean, SD	61.4 ± 10.0	64.3 ±11.5	0.007
Maternal weight gain (kg)	mean, SD	12. 6 ± 4.3	12.7 ± 4.5	0.8
Maternal weight at term (kg)	mean, SD	74.0 ± 10.3	77.0 ± 12.1	0.006
Maternal BMI at term (kg/m^2)	mean, SD	27.7 ± 3.6	28.7 ± 4.0	0.017
Urinary infection	n (%)	35 (11.0)	23 (16.5)	0.09
Pelvic floor contraction strength (cm H_20)*	mean, SD	35.4 ± 19.7	33.5 ± 17.1	0.39
Cephalic presentation	n (%)	305 (95.0)	133 (96.1)	0.32
Birth weight (g)	mean, SD	3306 ± 445	3315 ± 443	0.83

(*) Excluded from this analysis were 79 continent and 35 incontinent women

Table 2 Results of the multivariate analysis performed to associate SUI with different variables

	n	Stress Urinary Incontinence n (%)	OR	95% CI
Gestational age (days)				
< 279	221	63 (28.5)	1	
≥ 279	237	76 (32.1)	1.0	0.70-1.60
Urinary infection in pregnancy				
no	400	116 (29.0)	1	
yes	58	23 (39.7)	1.75	0.98-3.15
Maternal weight at the beginning of pregnancy (kg)				
< 63	267	67 (25.1)	1	
≥ 63	191	72 (37.7)	1.05	0.55-2.00
Maternal weight at term (kg)				
< 75	247	57 (23.1)	1	
≥ 75	211	82 (38.9)	2.09	1.09-3.99

OR = odds ratio

CI= confidence interval