

Prevalence and predictors of anal incontinence six years after first delivery

Abstract

Aims The main aim of the present study was to explore prevalence and predictors of anal incontinence (AI) experienced six years after first delivery.

Methods In this longitudinal prospective cohort study, participants in a previous study answered questions about AI six years after first delivery using postal or digital questionnaires. Prevalence of AI was calculated, and multivariable logistic regression analyses were applied.

Results A total of 731 (48%) of the original participants who gave birth to their first child between May 2009 and December 2010 responded six years after first delivery. There was a significant reduction in reports of one or more AI symptoms from late pregnancy (33%; 95% CI: 30.3, 37.2) to six years after first delivery (21%; 95% CI: 18.4, 24.4, $p=.028$). Older age at first delivery, BMI (≥ 35), active bowel disease, and previous problems with bowel evacuation and urgency when going to the toilet predicted AI at six years. Long-term AI was also associated with instrumental first delivery (Odds ratio (OR): 1.8; 95% CI: 1.1, 2.8) and sustaining a perianal tear grade three or four at first delivery (OR: 3.0; 95% CI: 1.3, 6.8).

Conclusions Prevalence of AI was significantly reduced from late pregnancy, still 21% experienced AI six years after first delivery. Findings from the present study indicate that an added focus on modifiable risk factors for AI such as BMI, OASIS and history of PFDs increase the risk of AI in the long term, may be beneficial in reducing incontinence problems the short-, and long-term.

Keywords Anal incontinence, postpartum, long-term follow-up

Introduction

Pelvic floor disorders (PFD) affect a large proportion of women of all ages. Anal incontinence (AI) has a potentially disabling and devastating effect on quality of life and sexual function in the short and long-term.⁽¹⁻³⁾ The joint terminology report on female anorectal dysfunction by the International Urogynecological Association/ International Continence Society defines AI as involuntary loss of faeces and/or flatus, whereas as involuntary loss of faeces only is defined as faecal incontinence (FI).⁽⁴⁾ Postpartum AI is mostly reported within 12 months after first delivery, and in our previous work, we found that one in four women reported one or more AI symptoms one year after delivery.⁽⁵⁾ Few studies have prospectively explored prevalence following more than one delivery or in the long-term.^(1, 6-8) The reported prevalence of long-term AI after delivery ranges from 7% to 35% four to five years after index delivery,^(6, 8) from 6% to 32% ten to fifteen years after index delivery,^(1, 9, 10) and 20% to 39% twenty years or more after index delivery.^(11, 12)

In women, AI is associated with pregnancy, vaginal delivery, pelvic floor muscle injuries, including obstetric anal sphincter injuries (OASIS) during delivery.⁽¹³⁻¹⁵⁾ However, previous studies have shown that women experiencing incontinence during pregnancy have a higher risk of incontinence in the short as well as long-term, suggesting involvement of non-delivery related factors.^(5, 6, 10) In a study by Donnelly and co-workers (1998), women with irritable bowel disease were found to have an increase in risk of postpartum faecal urgency and flatus incontinence in the short-term after delivery.⁽¹⁶⁾ Furthermore, older maternal age at first delivery and high BMI have been found to be associated with higher odds of long-term AI.^(1, 6) Thus, identifying modifiable risk factors and predictors of postpartum AI may be important in order to reduce AI in the long-term. Our aim was to explore the prevalence and predictors of anal incontinence six years after first delivery.

Materials and Methods

A total of 1571 women who gave birth to their first baby in two hospitals in separate health regions in Norway during the period May 2009 to December 2010 were included in a previously published prospective cohort study “First Time Mothers and Anal Incontinence”. One year after first delivery, 1031 women responded and recruitment details in the original study have been described elsewhere.⁽⁵⁾ Six years after their first delivery, the participants were contacted by postal mail and invited to take part in the present study. The participants were able to respond to the questionnaires either by postal mail using pre-stamped return envelopes, or using an online data collection system. Non-responders received postal reminders after 6-8 weeks. The participants answered questions about AI symptoms using the St. Mark’s incontinence score, subsequent pregnancies and deliveries, current marital, educational and work status and impact of AI symptoms on quality of life on a numerical rating scale (0-10). The St. Mark’s score measures the frequency of symptoms of AI during the last four weeks on a five point scale (never, rarely, sometimes, weekly and daily). It also includes three questions with dichotomous scales regarding the use of pads, constipating medicine (no= 0, yes =2 points) and the ability to defer defecation for 15 minutes (no = 4, yes = 0 points). The total St. Mark’s incontinence score ranges from complete continence (0 points) to complete incontinence (24 points).⁽¹⁷⁾

AI at all timepoints was defined as reporting FI (formed and/or loose stool) monthly or more, incontinence of flatus weekly or more, faecal urgency (15 minutes) or using pads or stopping medication on the St. Mark’s score.⁽⁵⁾ Moreover, participants categorised as experiencing AI were allocated to one of seven groups according to the specific AI symptom or combination of AI symptoms reported (urgency only, FI only, flatus incontinence only, combination of FI and urgency, FI and flatus incontinence, urgency and flatus incontinence or the combination of all three AI symptoms).⁽²⁾ Due to low numbers of participants experiencing formed stool

incontinence the variables formed or loose stool incontinence were combined as FI. Demographic data such as age, educational level, marital status, employment status, body mass index (BMI) in late pregnancy and obstetric data related to the first delivery such as mode of delivery, episiotomy, and OASIS were collected from medical records in the original study. Current demographic data and information about subsequent deliveries were self-reported. In late first pregnancy, BMI was categorised based on World Health Organisation recommendations and dichotomized according to the 90th percentile as obese class II (≥ 35.0 , kg/m²) or under. Age at first delivery was categorized based on the 10th, 50th and 90th percentiles and rounded off to the nearest whole year. Level of education was dichotomized into primary / secondary education, or College / University / PhD/ other in the logistic regression analyses.

Statistical analyses

Descriptive statistics was presented as frequencies, proportions and mean with standard deviation (SD) and range. Prevalence of AI was calculated with 95% confidence intervals (CI). The independent samples t-test or Mann-Whitney U test were used when comparing continuous variables between groups at baseline, one and six years after first delivery. The chi-square test was used when comparing categorical variables recorded at the same time point and the McNemar test was used for comparison of repeated categorical variables. The association between the primary outcome variables, experiencing FI, flatus incontinence, urgency or AI six years after first delivery, as dependent variables and selected independent background and delivery-related variables were assessed using univariable logistic regression analyses. Variables found to have an association with the primary outcome variables with a p-value lower than .20 in the univariate analyses were included in the multivariable logistic regression model. Multivariable logistic regression analyses were performed using backwards selection to evaluate the independent strength of association between risk factors for

experiencing AI symptoms at six years after first delivery. In each step the variable with the highest p-value was removed from the model until all variables were statistically significant with a p-value lower than 0.05. Effect estimates were presented as odds ratios (OR) with 95% CI. None of the variables in the multivariable logistic regression model were highly correlated (Variance Influencing Factor <2).

Statistical analyses were performed using STATA version 15 (StataCorp LLC, College Station TX, USA), IBM SPSS Statistics version 23 (IBM, Armonk, NY, USA) and Microsoft Excel for Windows® 2010 (Microsoft Corporation, Redmond WA, USA).

User involvement

Participants in our previous studies provided feedback on data collection, their experience with experiencing postpartum AI, and being offered pelvic floor muscle training (PFMT) in our intervention study.^(5, 18) A patient representative in the national patient organization provided feedback in the planning of the long-term study. The participants were not involved in obtaining funding, or the analyses of the present study findings.

Results

Six years after first delivery, questionnaires were sent to 1571 women included in the original cohort study.⁽⁵⁾ A total of 731 women (46.5%) responded at a mean of 6.4 (SD 0.4) years after their first delivery. Six women did not answer any questions on the St. Mark's score and were excluded from further statistical analyses. The remaining 725 were categorized as either continent (n=544) or incontinent (n=181) six years after first delivery (Figure 1). There were statistically significant differences between responders and non-responders at six years after first delivery with regards to age, marital status, level of education, employment status in late first pregnancy as well as number of women sustaining an OASIS at first delivery. Non-responders also had significantly higher St. Mark's scores in late pregnancy (mean 2.7, SD

3.3) points compared to responders (mean 2.1, SD 2.8; $p < .001$) (Table 1). Women experiencing AI at follow up tended to have more severe perineal tears ($p = .001$), and had significantly higher St. Mark's scores ($p < .001$) and BMI in late pregnancy ($p = .016$) compared to continent women (Table 1). Furthermore, fewer continent women had active bowel disease and more than twice as many incontinent women were unemployed, at six years after first delivery (Table 1).

There was a significant difference in the reported distribution of AI symptoms at six years after first delivery compared to late pregnancy ($p = .028$) and one year after first delivery ($p < .001$) (Figure 2). The total prevalence of reported AI symptoms was 33% [95% CI 29.5, 36.6] in late pregnancy, 20% [95% CI 17.2, 23.1] one year after delivery and 25% [21.8, 28.0] six years after first delivery (both $p < .001$). The prevalence of all individual AI symptoms was significantly higher in late pregnancy compared to six years later ($p < .035$). There only statistically significant difference between AI symptoms from one to six years after first delivery was found in formed stool incontinence ($p = .007$). The increase in reported flatus incontinence from 6% at one year to 8.5% at six years after delivery did not reach statistical significance ($p = .289$) (Figure 3).

The multivariable logistic regression analyses showed that older age at first delivery and being obese ($BMI \geq 35$) in late pregnancy significantly increased the risk of AI and flatus incontinence six years after first delivery. There was a strong association between OASIS and long-term FI, and the OR of long-term AI was 3.0 [1.3, 6.8] ($p = .010$), and 1.8 [1.1, 2.8] ($p = .024$) in women who sustained a third, or fourth degree perineal tear or had an instrumental first delivery, respectively. Furthermore, long-term FI and AI was significantly associated with experiencing general urgency when going to the toilet ($p < .001$), and reporting active bowel disease six years after first delivery ($p = .002$), whereas AI and faecal urgency were associated with problems with bowel evacuation in late pregnancy ($p = .03$) (Table 2).

Discussion

In this cohort study, the prevalence of most AI symptoms was significantly lower six years after first delivery compared to late pregnancy and one year after first delivery, except for a slight increase in flatus incontinence from one to six years after first delivery. Age, BMI, active bowel disease, problems with bowel evacuation and general urgency in late pregnancy increased the risk of AI at six years. The delivery-related factors associated with increased risk of AI in the long-term were sustaining an OASIS or experiencing an instrumental delivery at first delivery. Flatus and faecal urgency were associated with experiencing flatus incontinence and urgency in late pregnancy, respectively.

Few studies have explored the long-term prevalence of postpartum AI beyond the first year after delivery, and the reported prevalence varies depending on definition used and time of data collection. In the study by Pollack and co-workers (2004), FI alone was found to be relatively rare five years after first delivery, and all but one woman experiencing FI also reported flatus incontinence.⁽⁸⁾ Gartland and co-workers (2016) on the other hand found that 7% experienced FI, and 2.1% experienced moderate or severe FI symptoms, four years after first delivery.⁽⁶⁾ This is in concurrence with our present findings of 1% and 7% of women reporting formed and loose stool incontinence six years after first delivery, respectively. In a Swedish study ten years after first delivery, 32% reported AI, and women with severe symptoms prior to first delivery and five years after first delivery were at higher risk of AI compared to women with less severe symptoms.⁽¹⁰⁾ Twelve years after participating in a nurse-led pelvic floor muscle training intervention program to reduce postpartum urinary incontinence (UI) symptoms, 14% reported FI. Women with double incontinence six years after first delivery, had an increase in risk of persistent AI at 12 years later.⁽¹⁹⁾ In the present study, UI in late pregnancy increased the risk of flatus incontinence but no other AI symptom in the long-term.

Spontaneous postpartum mechanical, hormonal and neuromuscular changes may result in an improvement in pelvic floor function and thus a reduction in complaints of AI during the first year after delivery.⁽⁵⁾ The majority of the identified risk factors in the present study were not related to delivery, and there is conflicting evidence on the association between mode of delivery and postpartum AI in the long-term. Some studies report no association four to ten years after delivery.^(6, 20) Faltin and co-workers (2006) found that 18 years after delivery, only 6.4% of reported FI were attributable to OASIS,⁽²¹⁾ and no association between obstetrical history and FI was found amongst the women aged 50 to 61 years in the study by Fritel and co-workers (2007).⁽²²⁾ Others have indicated that women with forceps deliveries have increased odds of persistent FI at six and twelve years after index delivery.^(1, 7) Most women with instrumental first deliveries in the present study had vacuum extractions.⁽⁵⁾ Still instrumental delivery was associated with an OR of 1.8 for AI. In contrast to previous findings,⁽¹¹⁾ we found no association between instrumental delivery and FI only. Sustaining an OASIS at first delivery has previously been shown to increase the risk of postpartum AI. Similar to our previous work,⁽⁵⁾ OASIS was associated with increased risk of FI as well as AI, but not with flatus incontinence or urgency at six years after first delivery. In a similar study, more women with OASIS reported flatus incontinence (28% vs. 9%) and FI (5% vs. 1%) five years after first delivery compared to women with no OASIS.⁽⁸⁾ In the same cohort, ten years after their first delivery, more women with OASIS reported AI at any frequency (57% vs. 29%), and severe AI symptoms (30% vs. 13%) compared to women without OASIS.⁽¹⁰⁾ Moreover, some studies suggest an association between third-, and fourth degree perineal tears / OASIS and postpartum AI severity in the short-, and long-term.^(15, 23) Few respondents had a fourth degree perineal tears in the present study (3/725), thus we were unable to explore this association.

A strong association between AI and diarrhea among community-dwelling women aged 30 years and older has been reported.⁽²⁴⁾ Incontinence, constipation and problems with bowel evacuation are common complaints during pregnancy associated with hormonal and mechanical changes occurring during pregnancy.^(13, 25) Most pregnancy-induced bowel symptoms improve postpartum. However, previous reports indicate that more women report incomplete evacuation 12 months after first delivery than in late pregnancy, and constipation has been shown to increase the risk of AI during the first year postpartum.^(13, 25) Furthermore, some studies suggest that functional bowel disorders such as irritable bowel syndrome (IBS) may be underreported in women of childbearing age, and that IBS symptoms may relapse or worsen postpartum.⁽²⁵⁾ In the present study we found that women who had problems with bowel evacuation in late pregnancy and those with active bowel disease six years after first delivery were at increased risk of long-term FI and AI. Our previous findings have indicated a significant association between high BMI and FI one year after first delivery.⁽⁵⁾ In agreement with other long-term studies,^(1, 6, 12) we found that obese women (BMI \geq 35 in late pregnancy) were at significantly higher risk of AI and flatus incontinence six years after first delivery compared to women with lower or normal BMI. Other studies have shown that obesity and postpartum retention of weight gained during pregnancy increase the risk of AI, UI and pelvic organ prolapse, and influence symptoms severity.^(12, 26) Unfortunately our data did not include current BMI, and were thus unable to explore the association between BMI and long-term AI. However, the present findings indicate that limiting weight gain during pregnancy may result in the added benefit of reducing postpartum incontinence in the short as well as in the long-term. Others have suggested that the maternal health surveillance during pregnancy is a vital time for focusing on preventing obesity and subsequently incontinence symptoms,⁽²⁷⁾ and recommend extending the postpartum follow-up beyond six to eight weeks.⁽¹⁴⁾

The main strengths of the present study include the use of a validated, self-reported measure of AI, detailed information about AI experienced in late first pregnancy as well as one year postpartum, and the relatively large sample size at follow-up six years after first delivery. The response rate was just below 50% and comparable to similar, long-term follow-up studies.⁽¹⁾ The main limitation was the significant differences in background variables between responders and non-responders six years after first delivery, thus our findings must be interpreted with caution. More than twice as many non-responders were young (aged 18 to 22) first time mothers compared to the responders, and more non-responders were unemployed. In contrast to our previous work,⁽⁵⁾ we found no association between any AI symptom and young age at first delivery. However, in concurrence with previous long-term studies, older first time mothers (aged ≥ 34 years) were at increased risk of postpartum AI and flatus incontinence.^(1, 5) Despite the differences in work status between responders and non-responders in the present study, the association between being unemployed in late pregnancy and faecal urgency remained strong in late pregnancy⁽⁵⁾ as well as one⁽⁵⁾ and at six years after first delivery. Thus, these findings may indicate that embarrassment and social stigma associated with AI and faecal urgency⁽²⁾ is preventing women from taking part in normal working life. Effective treatment for AI including faecal urgency may be beneficial in reducing this problem.⁽¹⁸⁾

Conclusions

One in five women experienced AI six years after first delivery. Based on the long-term findings from the present study, an added focus on modifiable risk factors for AI such as BMI, OASIS and history of PFDs among postpartum women of all ages may be beneficial in reducing incontinence problems the short-, and long-term. Further studies exploring the

association between AI and background factors such as age, work status and pre-existing bowel disease are warranted.

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Legends

Figure 1. Flow chart of participants in the study First Time Mothers and Anal incontinence: 6 years after first delivery.

Figure 2. Percentage of women reporting anal incontinence symptoms in late pregnancy and six years after first delivery (n=725).

Figure 3. Prevalence of individual AI symptoms in late pregnancy, one and six years after delivery (n=725).

Table 1. Demographic and delivery-related characteristics of non-responders and responders six years after first delivery (n=1565).

Table 2. Risk factors for anal incontinence (AI) six years after first delivery. Results from multivariable logistic regression analyses and backwards selection including a total of 604 women; 152 women reporting AI at 6 years after first delivery.