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ORIGINAL ARTICLE

Cross-sectional study of early postpartum pelvic floor dysfunction and related bother in primiparous women 6–10 weeks postpartum

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Abstract

Introduction and hypothesis To study the prevalence of pelvic floor dysfunction and related bother in primiparous women 6–10 weeks postpartum, comparing vaginal and cesarean delivery.

Methods Cross-sectional study of 721 mothers with singleton births in Reykjavik, Iceland, 2015 to 2017, using an electronic questionnaire. Information on urinary and anal incontinence, pelvic organ prolapse and sexual dysfunction with related bother (trouble, nuisance, worry, annoyance) was collected. Main outcome measures were prevalence of pelvic floor dysfunction and related bother.

Results The overall prevalence of urinary and anal incontinence was 48% and 60%, respectively. Bother regarding urinary symptoms was experienced by 27% and for anal symptoms by 56%. Pelvic organ prolapse was noted by 29%, with less than half finding this bothersome. Fifty-five percent were sexually active, of whom 66% reported coital pain. Of all the women, 48% considered sexual issues bothersome. Urinary incontinence and pelvic organ prolapse were more prevalent in women who delivered vaginally compared to cesarean section, but no differences were observed for anal incontinence and coital pain. Compared to women with BMI < 25, obesity was a predictor for urinary incontinence after vaginal delivery (OR 1.94; 95% CI 1.20–3.14). Birthweight > 50th percentile was predictive for urgency incontinence after vaginal delivery (OR 1.53; 95% CI 1.05–2.21). Episiotomy predicted more anal incontinence (OR 2.19; 95% CI 1.30–3.67). No associations between maternal and delivery characteristics were found for pelvic floor dysfunction after cesarean section.

Conclusions Bothersome pelvic floor dysfunction symptoms are prevalent among first-time mothers in the immediate postpartum period.

Keywords Anal incontinence · Childbirth · Coital pain · Pelvic organ prolapse · Primiparas · Urinary incontinence

Abbreviations

AI	anal incontinence
APFQ	Australian Pelvic Floor Questionnaire
BMI	body mass index
CI	confidence interval
OR	odds ratio
PFD	pelvic floor dysfunction
PFM	pelvic floor muscles
POP	pelvic organ prolapse
SD	standard deviation
SUI	stress urinary incontinence
UI	urinary incontinence
UUI	urgency urinary incontinence

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Introduction

Childbirth can cause pelvic floor dysfunction (PFD) among women of childbearing age [1, 2], but the prevalence and how

much mode of delivery matters in the development of symptoms are less studied [3]. Previously, we showed that women going through either normal or instrumental vaginal birth had less pelvic floor muscle (PFM) strength and endurance around 6 weeks postpartum than women undergoing cesarean section [4], a finding subsequently confirmed [5].

Women suffering from urinary incontinence (UI), anal incontinence (AI) and pelvic organ prolapse (POP) also have a higher risk of developing sexual dysfunction [6]. In the early postpartum period, however, other factors must be considered, such as hormonal status that has not yet returned to the pre-pregnancy stage [7]. Symptoms of PFD are related to pelvic floor injuries and some obstetric/delivery factors, which may worsen these symptoms [3, 8]. During pregnancy and even after a cesarean section, women do, however, often experience symptoms of PFD, showing that predisposing pre-pregnancy maternal, genetic or hormonal characteristics play an additive and as yet undefined role [9]. Women presenting with postpartum PFD symptoms are also likelier to suffer from depression and anxiety [10]. Symptoms of AI, such as uncontrolled flatus, primarily related to obstetric anal sphincter tears, are distressing for women [11, 12]. Physical and psychological dysfunction connected to PFD can therefore negatively influence the experience of new motherhood.

In the clinical setting it is therefore important to have information about the prevalence of postpartum PFD and establish the extent of potential problems when women seek advice after childbirth.

Our primary aim was to study the prevalence of PFD and related bother in a primiparous population with relatively high birthweight [13], 6–10 weeks after delivery, and compare vaginal delivery and cesarean section in this respect. We also sought to describe delivery-related characteristics associated with PFD at this commonly used time for health check-ups after childbirth.

Materials and methods

Study design

This was a cross-sectional study of 721 healthy Caucasian primiparous mothers with a singleton pregnancy. Information on maternal characteristics and delivery outcomes was extracted from hospital records. Symptoms of pelvic floor dysfunction were evaluated through a self-administered electronic questionnaire 6–10 weeks postpartum. Inclusion criteria were ≥ 18 years of age and understanding Icelandic. Exclusion criteria were stillbirth, multiple birth, delivery < 28 gestational weeks or an unwell newborn, and pre-existing diseases/conditions likely to predispose to PFD. This comprised previous bladder/bowel diseases and neurological, psychiatric and cognitive disabilities that could influence women's ability to answer the questionnaire.

Ethical approval was obtained from the Icelandic National Bioethics Committee (Ref: VSN-13-189), the Data Protection Authority (Ref: 2014030475TS/−−) and Landspitali University Hospital (Ref: 14. OB/ei).

Recruitment and participants

Women were recruited at Landspitali University Hospital, Reykjavik, between April 2015 to March 2017. Before being discharged from the maternity ward staff midwives asked eligible mothers to take part in the questionnaire study and give their e-mail address for further information and formal consent. The study comprised in this way a convenience sample but without any systematic selection mode. An e-mail including a weblink to the questionnaire and detailed information about the study was then sent to the participants 6 weeks postpartum. The link was active for 4 weeks. Weekly reminder e-mails were sent up to three times. Answering the questionnaire was taken to indicate informed consent. Of 858 women who agreed to participate, 721 (84%) returned the questionnaires.

Outcome assessment

An Icelandic translation of the Australian Pelvic Floor Questionnaire (APFQ) was used [15]. This had been translated and pre-tested in line with the recommendations of Beaton et al. [16] and involved two independent professional translations into Icelandic and a back-translation to English. After consensus was reached the questionnaire was pre-tested in 20 women. Approval for use of the APFQ was obtained from the authors. The questionnaire has four domains that applied to the 4 weeks before answering: bladder, bowel and prolapse symptoms and sexual function. Urinary, flatus and fecal (liquid or solid) incontinence was defined by frequency of leakage. Other questions include nocturnal symptoms, pain and bladder-emptying problems, constipation, prolapse described as vaginal protrusion or heaviness, the need for manual pressure to void or empty the bowels, coital pain and incontinence. Answering "never" was considered equal to no symptoms in all domains. Questions used for UI were: Does urine leak when you rush or hurry to the toilet? Do you not make it in time? Do you leak with coughing, sneezing, laughing or exercising? This also distinguished between urgency (UUI) and stress (SUI) urinary incontinence. For AI the questions were: "When you get wind or flatus, can you control it or does wind leak?," "Do you leak watery stool when you do not mean to?" and "Do you leak normal stool when you do not mean to?" POP was investigated by asking "Do you have a sensation of tissue protrusion or a lump or bulging in your vagina?" and "Do you experience vaginal pressure or heaviness or a

dragging sensation?" Regarding sexual function the questions "Are you sexually active?," "Do you experience pain with sexual intercourse?" and "Do you leak urine during sexual intercourse?" were used. Additionally, we analyzed answers from the question: "Do you feel that your vagina is too loose or lax?" Answers of "occasionally," "frequently" and "daily" were considered to indicate symptoms.

Bother is a concept used in the APFQ and can be defined as trouble, nuisance, worry or something annoying. Bother in all symptom domains was considered absent when the answer was "not at all" or "not applicable, I do not have a problem." Answers of "slightly, moderately," and "greatly" were considered as bother. According to this approach, data were analyzed according to two categories: 0 = no symptoms or no bother and 1 = signs of symptoms and/or of bother. Total domain scores attainable for each domain were calculated into the range 0–10, where a higher score indicated more symptoms and bother.

Information on maternal characteristics and birth outcomes

Maternal charcteristics and birth outcomes were extracted from the Icelandic Medical Birth Register. This included maternal age (years), body mass index (BMI) as kg/m^2 at the first antenatal visit, delivery mode, duration of first and second labor stages (registered in minutes, converted to hours), third- and fourth-degree perineal tears, episiotomy, anesthesia/epidural, fetal presentation, birthweight (g), birth length and newborn head circumference (cm).

Statistics

When describing continuous normally distributed variables, the mean and standard deviation (SD) were used while precentages were applied to describe dichotomous outcomes. Stages of labor, which are skewed continuous variables, were described with median and 10th–90th percentiles. The chi-squared test was used for formal differences between groups with regard to dichotomous outcomes, while the *t*-test was used for continuous outcomes. Prevalences of self-reported PFD and related bother were described in terms of proportions (%) and frequencies (*n*) for all women and stratified by mode of delivery (vaginal delivery and cesarean section).

Associations between maternal characteristics and other obstetric outcomes with pelvic floor dysfunction stratified by vaginal delivery and cesarean section were then examined using multiple binary logistic regression. Maternal characteristics and birth outcomes included maternal age, BMI < 25 kg/m^2 = reference group compared to overweight ≤ 30 kg/m^2, and obesity > 30 kg/m^2), birthweight [≤ 50th (≤ 3600 g) vs. > 50th percentile (> 3600 g)], length of second-stage labor in hours (with ≤ 1 h as a reference), presence or absence of third- and fourth-degree perineal tears, episiotomy and instrumental delivery (vacuum and forceps extractions). As a result of co-linearity between birthweight and newborn head circumference (r = 0.8, $p < 0.001$), only birthweight was used for analysis. For these characteristics missing values were generally low (1–4%), and complete case analyses were performed. Underweight women (BMI < 18.5), who numbered only 19, were added to the BMI reference group.

Post hoc, considering the prevalence of urinary symptoms among those giving birth vaginally and with anticipated differences being lower among those giving birth with cesarean section, we calculated that by having 120 cesarean sections and a power of 80%, we would detect an absolute difference in prevalence of 13%. Thus, we considered the study to have been sufficiently powered and the sample size adequate.

We used SPSS, version 26 (IBM, Armonk, NY, USA), for all statistical analyses. Significance levels were set to $p < 0.05$.

Results

Participant characteristics

Table 1 shows characteristics of the women and delivery outcomes. Eighty-three percent (601/721) of the women delivered vaginally, and 17% (120/721) had cesarean section. Mean age was 27 (range 18–47) years. Women with cesarean section were older than women giving birth vaginally, 29 (SD 5.7) vs. 27 (SD 4.6) years ($p = 0.0012$) and had higher BMIs, 28 (SD 6.2) vs. 25 (SD 5.4) ($p = 0.007$). Only 8 of 98 women delivering with emergency cesarean section reached the second stage of labor. Mean birthweight was slightly but significantly higher for women giving birth vaginally, 3575 (SD 511) g compared to the cesarean group, 3559 (SD 748) g ($p < 0.001$).

Prevalence of PFD

Table 2 shows the frequency of PFD symptoms. Women reporting no symptoms constituted 12%. Missing values were 1–4% for individual questions in the APFQ. The prevalence of any UI was 48% (343/708) with 27% (195/708) of all the women finding urinary symptoms bothersome. AI was present in 60% (430/714), with 92% ($n = 396$) of these women suffering only flatus incontinence. Of all women 56% (400/714) reported their anal symptoms as bothersome. The prevalence of AI was not different between those with or without third- and fourth-degree perineal tears ($p = 0.3$). POP symptoms were reported by 29% of the women (205/695), and 13% (94/695) considered this bothersome.

Sexually active women at 6–10 weeks were 55% (386/700). Of them, 3% ($n = 10$) experienced coital urinary incontinence and 66% (254/386) pain during intercourse. Of all the

Table 1 Characteristics of study participants[1]. Presented as mean with SD or numbers (*n*) and %

	All participants (*n*=721)	Vaginal delivery (*n*=601)	Cesarean delivery (*n*=120)	*p* value[2]
Age at first antenatal visit (years)	27 (4.8)	27 (4.6)	29 (5.7)	0.002
BMI at first antenatal visit (kg/m^2)	26 (5.6)	25 (5.4)	28 (6.2)	0.007
BMI < 18.5 kg/m^2	3%	3%	2%	
BMI 18.5 –<25 kg/m^2	54%	58%	37%	
BMI 25 –≤30 kg/m^2	24%	23%	28%	
BMI > 30 kg/m+	20%	17%	34%	
Gestational length (weeks)	39.5 (1.6)	39.5 (1.4)	39.2 (2.2)	< 0.001
Newborn variables				
Birthweight (g)	3572 (557)	3575 (511)	3559 (748)	< 0.001
Delivery variables				
Mode of delivery (%)				
Vaginal delivery (*n*=601)	83%			
Spontaneous vaginal delivery	67%			
Instrumental; vacuum and forceps	19%			
3rd- and 4th-degree perineal tears	8%			
Episiotomy	17%			
Epidural anesthesia	66%			
Length of 1st stage (hours)[3]	10 (3.75–18.25)			
Length of 2nd stage (hours)[3]	1.15 (0.38–3.39)			
Cesarean delivery (*n*=120)	17%			
Emergency[4]	14%			
Elective	3%			

[1] Independent samples *t*-test for continuous variables. [2] *p* value for differences between vaginal and cesarean delivery. [3] Median with 10th–90th percentile. [4] Eight percent of women going through emergency cesarean delivery reached the second stage of labor, one of them after failed instrumental delivery

women, including those who were not sexually active, 48% (336/700) found sexual issues bothersome. Urinary and prolapse symptoms were more prevalent in women who delivered vaginally, but AI prevalence was not different. More women in the cesarean section group were sexually active (65% vs. 53% for vaginal delivery, $p = 0.03$) but the rate of coital pain was not different between delivery routes. Significantly more women who delivered vaginally experienced introital coital pain while this was experienced more evenly between the introital and deep pelvic locations for women with cesarean delivery. Sixteen percent (96/601) of the women who delivered vaginally reported feeling their vagina to be loose or lax compared to 7.5% (9/120) of the cesarean delivery group ($p < 0.001$) (Table 2).

No symptoms or only one were more common among women having a cesarean section (64%, 77/120) compared to 41% (245/601) of the women who had delivered vaginally. Two, three and four symptoms prevailed to a greater degree among those delivering vaginally [59%, (356/601) vs. 36%, (43/120)] of cesarean section women ($p < 0.001$).

Table 3 shows the association between PFD and maternal characteristics and birth outcomes among women who delivered vaginally. Compared to women with BMI < 25, being obese at first antenatal visit was significantly associated with postpartum UI. Higher birthweights > 50th percentile were significantly associated with UUI. Undergoing episiotomy during vaginal delivery was significantly linked to AI. No association was seen in women with vaginal delivery to symptoms of SUI, coital pain or POP and delivery factors. No association with PFD was observed between maternal characteristics and birth outcomes among women giving birth by cesarean section (Table 4).

Domain scores are shown in Table 5. By analyzing the original scores for every question in each domain of the questionnaire according to mode of delivery, a significant difference was evident between the groups in the scores pertaining to bladder function, prolapse and the sexual domains, with higher scores seen in the vaginal delivery group in all cases. No difference between groups was observed in the bowel domain.

Discussion

Main findings

In this study high rates of symptoms from urinary (48%) and anal incontinence (60%), POP (29%) and coital pain (66% of

Table 2 Frequency of symptomatic women with pelvic floor dysfunction[1] 6–10 weeks postpartum

	All participants (n=721)	Vaginal delivery (n=601)	Cesarean delivery (n=120)	p value[2]
Urinary incontinence[3]	48%	52%	27%	< 0.001
SUI	37%	40%	20%	< 0.001
SUI	30%	32%	18%	0.002
Anal incontinence	60%	61%	58%	0.6
Flatus incontinence	55%	56%	55%	
Combination of flatus and fecal incontinence	5%	5%	3%	
Prolapse symptoms	29%	33%	12%	< 0.001
Sexually active women	55%	53%	65%	0.03
Coital incontinence[4]	3%	3%	3%	1.0
Coital pain[4]	66%	68%	64%	0.5
Introital pain[5]	51%	54%	38%	0.03
Deep vaginal pain[5]	26%	24%	31%	
Both introital&deep[5]	23%	22%	31%	
Vagina feels loose or lax	15%	16%	7.5%	< 0.001

[1] Answers based on the Icelandic translation of the Australian Pelvic Floor Questionnaire. Analyzed by chi-squared test. Answers represent the number of women who did answer different questions (missing values were 1–4% of answers). [2] p value for differences between vaginal and cesarean delivery

[3] Of women suffering UI, 132 had mixed UI (both SUI and UUI), 120 in the vaginal delivery group and 12 from the cesarean section group. SUI, stress urinary incontinence; UUI, urgency urinary incontinence. [4] Of sexually active women. [5] Location of coital pain

sexually active women) were reported overall among first-time mothers at 6–10 weeks after delivery. All forms of UI, POP and related postpartum bother were more prevalent after vaginal delivery compared with cesarean section, while for AI and coital pain there was no difference. After vaginal delivery multiple symptoms were more likely. After evaluating prevalence for the vaginal delivery and cesarean section groups we examined with logistic regression associations between each PFD symptom and delivery factors. For women with vaginal delivery there was a clear association between episiotomy and AI as well as between higher birthweights and UUI. Obesity was significantly associated with UI and showed borderline associations with SUI and UUI, among women who had delivered vaginally. The total scores for all domains of the APFQ were higher for women who delivered vaginally except for the bowel domain.

Interpretation

The cohort was selected over 2 years as a convenience sample, which, however, was not preselected in any particular way and could thus be considered as representative of healthy primiparous women in the population, comprising around 30% of all such women delivering in the study period. The findings concur with previous studies showing increased prevalences of UI, SUI and UUI in the early postpartum period among primiparous women after vaginal delivery compared to those having had a cesarean section [14]. In a systematic review UI was reported to be twice as high at 3 months postpartum for women delivering vaginally, while results for AI were inconclusive [14].

We found an association between obesity at first antenatal visit and UI, a finding which was also borderline significant for UUI and SUI. Reflecting the population prevalence, a high number of the participating women were obese (20%), with BMIs from 30 to 50 kg/m^2. Obesity is modifiable, and this emphasizes the need for education about lifestyle before and during pregnancy, such as providing incentives and advice for healthy eating and physical activity.

The association between higher birthweight and having urinary symptoms was only present for UUI. Higher birthweight and increased neonatal head circumference have been considered risk factors for urinary symptoms [3].

Anal incontince was a highly prevalent complaint, with 60% of women reporting symptoms and 56% of all the women being bothered by this. Even though this mostly concerned flatulence, women are not indifferent to this, since anal symptoms probably cause more social embarrassment than mild or moderate UI [11, 17]. There were no differences in the AI prevalence between delivery modes, as has been noted before [18]. Furthermore, we could not associate anal sphincter tears with increased rates of AI, even though 8% of the women suffered such damage to their pelvic outlet. This may partly be due to increased awareness and better immediate repair practices for serious obstetric sphincter ruptures during the last 2 decades [19]. Over time, women with pelvic floor injuries may however become more vulnerable to adverse symptoms, as suggested by DeLancey et al. [20]. Continuity of

Table 3 Associations between maternal characteristics and delivery outcomes with pelvic floor dysfunction after vaginal delivery (n=601)

	Urinary incontinence			Stress urinary incontinence			Urgency urinary incontinence		
	OR	(95% CI)	*P*- value	OR	(95% CI)	*P*- value	OR	(95% CI)	*p*- value
Maternal age	1.00	(0.97–1.04)	0.9	1.02	(0.98–1.06)	0.3	1.02	(0.98–1.06)	0.4
Maternal BMI[1]									
BMI <25kg/m^2	1.00			1			1		
BMI 25-≤30kg/m^2	1.06	(0.70–1.61)	0.8	0.99	(0.65–1.51)	1.0	1.03	(0.66–1.61)	0.9
BMI >30 kg/m^2	**1.94**	**(1.20–3.14)**	**0.007**	1.53	(0.96–2.43)	0.08	1.53	(0.94–2.48)	0.09
Birthweight									
≤50th percentile (≤3600 g)	1			1			1		
>50th percentile (>3600 g)	1.16	(0.82–1.65)	0.4	1.08	(0.76–1.53)	0.7	**1.53**	**(1.05–2.21)**	**0.03**
Length of 2nd stage of labor									
≤1 hour	1			1			1		
>1 hour	0.91	(0.64–1.29)	0.6	0.80	(0.56–1.15)	0.2	1.08	(0.74–1.57)	0.7
Anal sphincter tear (3rd and 4th degree, yes vs. no)	1.17	(0.64–2.17)	0.6	1.00	(0.54–1.85)	1.0	1.00	(0.52–1.92)	1.0
Episiotomy (yes vs. no)	0.81	(0.51–1.29)	0.4	0.94	(0.59–1.51)	0.8	0.83	(0.50–1.39)	0.5
Instrumental delivery (yes vs. no)	1.00	(0.64–1.60)	1.0	1.23	(0.78–1.96)	0.4	0.76	(0.46–1.26)	0.3
	Anal incontinence			Prolapse symptoms			Coital pain		
	OR	(95% CI)	*P*- value	OR	(95% CI)	*P*- value	OR	(95% CI)	*p*- value
Maternal age	1.02	(0.98–1.06)	0.3	1.02	(0.98–1.06)	0.4	0.95	(0.90–1.01)	0.1
Maternal BMI[1]									
BMI <25kg/m^2	1			1			1		
BMI 25-≤30kg/m^2	0.79	(0.52–1.21)	0.3	1.24	(0.80–1.92)	0.3	1.48	(0.76–2.89)	0.2
BMI >30 kg/m^2	0.80	(0.50–1.30)	0.4	0.66	(0.39–1.13)	0.1	0.74	(0.39–1.41)	0.4
Birthweight									
≤50th percentile (≤3.6 kg)	1			1			1		
>50th percentile (>3.6 kg)	1.17	(0.82–1.66)	0.4	0.91	(0.63–1.32)	0.6	0.78	(0.46–1.31)	0.3
Length of 2nd stage of labor									
≤1 hour	1			1			1		
>1 hour	0.90	(0.63–1.29)	0.6	0.99	(0.68–1.45)	0.9	1.38	(0.81–2.33)	0.2
Anal sphincter tear (3rd and 4th degree, yes vs. no)	1.28	(0.67–2.44)	0.5	1.63	(0.87–3.03)	0.1	2.30	(0.47–11.29)	0.3
Episiotomy (yes vs. no)	**2.19**	**(1.30–3.67)**	**0.003**	0.81	(0.49–1.35)	0.4	0.89	(0.41–1.92)	0.8
Instrumental delivery (yes vs. no)	1.00	(0.62–1.62)	1.0	0.98	(0.60–1.61)	0.9	1.78	(0.78–4.04)	0.2

[1] BMI (body mass index, kg/m^2) in the first antenatal visit. Reference category for BMI is normal and underweight BMI (<25 kg/m^2 , thereof 19 women being underweight (<18.5 kg/m^2 category))

bothersome symptoms from a first pregnancy and into later life stages and further child-bearing requires better exploration.

Episiotomy also doubled the odds of AI. Cescon et al. showed evidence of damage to the external anal sphincter muscle innervation at the site of the episiotomy at 6–8 weeks postpartum, a phenomenon not present in women who delivered without episiotomy or by cesarean section [21]. This might explain the association between episiotomy and AI found at a similar time in this study, when the pelvic floor tissues were still at a recovery stage.

Bother from prolapse was the least reported bother in our study, suggesting that the symptoms were mostly mild. Although three times more common among women with vaginal delivery, no single factor was identified as a potential risk for POP. The strongest risk for clinically objective POP 6–10 weeks postpartum has previously been related to the pre-labor pelvic floor state rather than delivery variables [22]. After a first delivery women seem to have a good ability to recover from POP symptoms [9].

Bother from sexual dysfunction was, however, high. Of all the women, including those who reported not being sexually

Table 4 Associations between maternal characteristics and birthweight with pelvic floor dysfunction after cesarean delivery (n=120)

	Urinary incontinence			Stress urinary incontinence			Urgency urinary incontinence		
	OR	(95% CI)	*P*- value	OR	(95% CI)	*P*- value	OR	(95% CI)	*p*- value
Maternal age	0.96	(0.89–1.04)	0.3	0.95	(0.86–1.04)	0.2	0.97	(0.89–1.07)	0.5
Maternal BMI[1]									
BMI <25kg/m^2	1			1			1		
BMI 25-≤30kg/m^2	1.63	(0.58–4.52)	0.4	0.92	(0.28–3.02)	0.9	1.36	(0.39–4.77)	0.6
BMI >30 kg/m^2	1.25	(0.44–3.44)	0.7	1.26	(0.42–3.81)	0.7	1.78	(0.55–5.75)	0.3
Birthweight									
≤50th percentile (≤3600 g)	1			1			1		
>50th percentile (>3600 g)	0.75	(0.32–1.73)	0.5	0.63	(0.24–1.62)	0.3	0.63	(0.23–1.68)	0.4
	Anal incontinence			Prolapse symptoms			Coital pain		
	OR	(95% CI)	*P*- value	OR	(95% CI)	*P*- value	OR	(95% CI)	*p*- value
Maternal age	1.02	(0.95–1.09)	0.6	0.90	(0.79–1.01)	0.08	1.0	(0.91–1.08)	0.9
Maternal BMI[1]									
BMI <25kg/m^2	1			1			1		
BMI 25-≤30kg/m^2	0.64	(0.26–1.61)	0.3	0.93	(0.19–4.60)	0.9	1.36	(0.36–5.17)	0.6
BMI >30 kg/m^2	0.87	(0.36–2.08)	0.7	2.69	(0.69–10.59)	0.2	1.02	(0.34–3.03)	1.0
Birthweight									
≤50th percentile (≤3600 g)	1			1			1		
>50th percentile (>3600 g)	1.10	(0.52–2.30)	0.8	0.48	(0.15–1.59)	0.2	1.60	(0.60–4.30)	0.3

[1] BMI (body mass index, kg/m^2) in the first antenatal visit. Reference category for BMI is normal and underweight BMI (<25 kg/m^2 , thereof 19 women being underweight (<18.5 kg/m^2 category))

active, 48% considered sexual issues as bothersome. This concurs with Lipschuetz et al. [17] who described high rates of bother from dyspareunia 1 year after first childbirth, underlining the need for healthcare providers to pay attention to sexual function during and after the puerperium. Postpartum sexual issues merit robust research, because factors pre-dating the childbirth can influence this, such as partnership quality, prior violence experiences, sleep deprivation, depression and breastfeeding [23].

Sexual dysfunction soon after childbirth seems to have a predictive value for continuing symptoms [7]. Similar to Tennfjord et al. [24], we found no difference in the prevalence of coital pain between women with vaginal delivery or cesarean section, but a link between dyspareunia and breastfeeding is known [7, 24]. This may have been the case in our study, because breastfeeding is almost universal in Iceland during the first months postpartum [25]. A link between a higher risk for PFD and increased maternal age was not found. The study women were relatively young (mean age 27 years), while the cesarean section group was both older and had higher BMIs than the vaginal delivery women.

Women who delivered vaginally had higher mean scores of bladder, prolapse and sexual domains of the APFQ, but not in the bowel domain. The higher mean score from the sexual domain for vaginal delivery was in contrast with similar rates of coital pain for the delivery groups. We decided to look deeper into the questions in the domain and found that women delivering vaginally reported more often feeling their vagina was too loose or lax, a symptom clearly adding to the total scores of this domain.

The questionnaire has a variety of questions, in all 42 regarding the function and symptoms of the pelvic organs and how these affect and bother women. Not all of the questions were analyzed in the present study, but the overall scores give an indication of the status at this time after childbirth. The domain score differences between modes of delivery can nontheless be considered to fall within the concept of "minimal important difference" [26].

During the postpartum period many women may need a tangible opportunity to speak to healthcare providers about their concerns regarding PFD. The high response rate in this study indicates that women are ready to open a conversation which could lead to useful advice for appropriate treatment options soon after childbirth. Studies have shown that postpartum pelvic floor muscle training will reduce UI [27, 28], although less evidence is available regarding postpartum treatment of POP and AI symptoms [28, 29]. Healing and restitution will take time [30], and bothersome symptoms must be expected, not least in a population where breastfeeding is almost universal and estrogenic status therefore low [24].

Table 5 Scores according to individual symptom category for women with vaginal delivery and cesarean section. The Australian Pelvic Floor Questionnaire grades each domain of pelvic floor symptoms, where scores from all questions in the domains are added and calculated as 0-10. Higher scores signify more symptoms

	Vaginal delivery mean (95% CI)	Cesarean section mean (95% CI)	*p*-value
Total scores - bladder domain*	1.05 (0.97–1.13)	0.73 (0.58–0.88)	**0.001**
Total scores - bowel domain*	1.99 (1.91–2.08)	1.82 (1.66–1.99)	0.108
Total scores - prolapse domain*	0.64 (0.54–0.73)	0.15 (0.07–0.23)	**<0.001**
Total scores - sexual domain*	1.79 (1.59–1.99)	1.23 (0.93–1.53)	**0.020**

*Independent sample *t*-test

Knowledge about circumstances that lead to postpartum PFD bother should be part of general education on maternity and childbearing.

Strengths and limitations

Strengths of this study were a large sample size, high response rate, use of data from a national medical birth register and the covering of four PFD domains, including sexual dysfunction, in the APFQ. A lack of formal validation of the Icelandic translation of the questionnaire was a limitation, but it was translated and pretested according to rigorous methodology. We also lacked pre-birth information on the issues addressed in the APFQ domains. Longer follow-up of all the women would have been desirable. Information is needed on the extent to which symptoms and bother pre-exist or are persistent phenomena in relation to new motherhood.

Conclusions

In a population where birthweight is relatively high, PFD and related bothersome symptoms were common among Caucasian primiparas 6–10 weeks postpartum, reflecting a sensitive time after childbirth among first-time mothers. Women delivering vaginally are more likely than women going through cesarean section to suffer from urinary and prolapse symptoms and related bother, but not from anal symptoms or coital pain.

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Declarations

Details of ethics approval Ethical approval was obtained from Icelandic National Bioethics Committee (Ref: VSN-13-189), and the Data Protection Authority granted permission as well (Ref: 2014030475TS/—). The study was conducted in accordance with the Helsinki Declaration on human experimentation.

Disclosure of interests The authors report no conflict of interest.

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