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Prevalence and trends of pelvic floor disorders in late pregnancy and after delivery in a cohort of Israeli women using the PFDI-20

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ABSTRACT

Objective: To investigate the prevalence of pelvic floor disorders (PFD) in a cohort of Israeli women at late pregnancy and three months postpartum, to define changes in PFD rates and to evaluate various obstetrical factors that may correlate with these changes.

Methods: A prospective longitudinal cohort study was conducted between March and July 2014. The PFDI-20 questionnaire (validated in the Hebrew language) was used to evaluate pelvic floor distress symptoms 24 h and 3 months after delivery (representing the third trimester and post-partum period, respectively). Patients with a preterm delivery (<36 completed weeks of gestation), delivery of a stillbirth, non-fluency in Hebrew and patients with inability to complete the questionnaire due to a communication problem were excluded from the study. In addition to the PFDI results demographic and clinical data were collected from the patients' medical records. Routine statistical methods were used to interpret the results.

Results: During the study period 117 women answered the first questionnaire and only 37 had filled the second questionnaire. The most prevalent item group reported in the third trimester was the urinary distress symptoms. Urinary frequency was the most common with 65% of patients reporting this symptom. At the post-partum period the most prevalent item group reported was the colorectal and anal distress with 31.5% of patients reporting increased straining efforts. There was a mixed trend in the changes noted between the two questionnaires. While some items improved in the puerperium as compared with late pregnancy others have worsened. In a multivariable analysis the only statistically significant finding was that at the post-partum follow-up, stress urinary incontinence was significantly associated with spontaneous perineal tears at delivery. Other obstetrical parameters including episiotomy and birth weight were not found to be significantly associated with any of the PFD items.

Conclusion: We have demonstrated that PFD is prevalent both in late pregnancy and in the puerperium. There are mixed trends of spontaneous recovery following childbirth. A significant association between perineal tears and SUI 3 months after delivery was noted.

Introduction

Pelvic floor disorders (PFD) including pelvic organ prolapse (POP), urinary incontinence (UI) and colorectal dysfunction (CRD) in pregnancy and the postpartum period are a common occurrence. PFD are a major public health problem affecting the quality of life (QoL) and with resultant psychosocial effects including discomfort, anxiety, embarrassment, loss of self-esteem and frustration [1,2]. In addition, they hold overwhelming economic costs [1]. PFD has been widely investigated both in developed [3,4] and in developing [5] countries. The reported prevalence of these conditions varies widely both during and after pregnancy [3–9].

Estimating the true prevalence of PFD is important for several reasons including assessing the public health burden of postpartum PFD, for research design in order to estimate sample sizes and

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investigating reasons for differences in prevalence between studies may lead to identification of subsets of women that are at a higher risk for postpartum PFD [10,11].

There are several reasons why prevalence may differ between studies, including differences in populations, differences in study design and differences in subgroups studied. It is not known to what degree these differences in study methods or populations may explain the widely different prevalence reported [11].

Many risk factors seem to be involved in postpartum PFD and later in life, among which there is growing evidence for the impact of delivery mode [3–8,10]. The effects of pregnancy itself, even before any birth trauma occurs have also been implicated as an independent risk factor for PFD [4]. Other risk factors that have been investigated include among others parity, instrumental delivery, obstetrical trauma, episiotomy, length of the first and second stages of labor and neonatal weight [3–10]. Despite its frequent occurrence, many aspects of the pathophysiology in association with pregnancy, delivery and the puerperium remain uncertain.

The prevalence of some PFD is maximal not postpartum, but rather during pregnancy. For example, 30–50% of pregnant women have reported SUI [8,12]. Moreover, a comparable drop in the prevalence of SUI following delivery and over the initial months postpartum has been observed [12]. In a study by Viktrup et al. [13] a follow-up of 305 primiparous women had shown a remission of incontinence over the first 12 months postpartum, with the prevalence of SUI reducing from 19% in the immediate postpartum period to 6% three months later and to 3% after one year [13]. These observations tend to suggest a deleterious, yet reversible, effect of pregnancy on PFD.

Assessment of PFD and the effect of PFD on QoL have been facilitated by the development of disease specific questionnaires like Pelvic Floor Distress Inventory (PFDI) [14,15]. The application of this instrument enables an objective measurement of the prevalence and the impact of PFD on a woman's daily life. The PFDI-20 is a 20 item questionnaire divided into 6 items evaluating POP distress (POPDI), 8 items evaluating colorectal anal distress (CRADI) and 6 items evaluating urinary distress (UDI) [14].

The aim of this study was to investigate the prevalence of PFD in a cohort of Israeli women at late pregnancy and three months postpartum. Moreover, we intended to define changes in PFD and evaluate various obstetrical factors that may correlate with these changes.

Methods

Study design

This was a prospective longitudinal cohort study was conducted between March and July 2014 at the Soroka University Medical Center, a 1000-bed tertiary teaching hospital. It is the only tertiary center for a population of 700,000 residing in Southern Israel. The average annual number of deliveries managed at our medical center is around 12,500. The study received the institutional ethical review board approval.

After receiving an explanation about the study, patients gave their informed consent before participation. In addition, all women received an explanation about pelvic floor physiotherapy treatment options during the puerperium that in Israel are included in the health package. Patients were approached within 24 h of a delivery and were asked to fill the PFDI-20 questionnaire (representing the third trimester of pregnancy). This questionnaire has been validated and used in the Hebrew language [16]. They all agreed for a telephone interview to fill a follow-up questionnaire three months later.

Study population

Women were recruited to the study from the maternity ward of the Soroka University Medical Center, within 24 h from delivery. Inclusion criteria included age over 18, delivery within 24 h at the Soroka University Medical Center, fluency in Hebrew.

Patients with a preterm delivery (<36 completed weeks of gestation), delivery of a stillbirth, non-fluency in Hebrew and patients with inability to complete the questionnaire due to a communication problem were excluded from the study.

Data collection

The PFDI 20 questionnaire was answered in the 24 h post-partum reflecting the state at the last three months of pregnancy and again at three months post-partum reflecting the puerperium period.

In addition, data were collected from the patients' medical records. Data included maternal age, parity and demographic characteristics. And clinical characteristics included mode of delivery (vaginal delivery, instrumental delivery, elective cesarean delivery and emergency cesarean delivery), neonatal birth weight, episiotomy and spontaneous perineal tears.

At the three months follow-up patients were asked regarding utilization of the physiotherapy services offered to them.

Data analysis

The data for every woman on PFDI items at the third trimester and the post-partum period were compared. Continuous variables with normal distribution were presented as mean ± SD, and comparisons were made using the Student's *t*-test. Categorical data were shown in counts and percentages and the differences were assessed by Spearman's correlation coefficient. Only statistically significant variables with a $p < 0.05$ and a confidence interval (CI) of 95% were included in the model.

Results

During the study period a 122 parturient were recruited to the study of witch five women were excluded because they did not meet the inclusion criteria. The demographic and clinical characteristics of the study group are presented in Table 1. Mean maternal age was 30.84 ± 5.05 (range 19–44) and mean birth weight was 3.344 ± 0.628 kg (range 2.204–6.405 kg).

The results of the third trimester PFDI-20 questionnaire are presented in Table 2. The items were divided according to the original division described by Barber et al. [14] into 6 items evaluating POPDI, 8 items evaluating CRADI and 6 items evaluating UDI. The most prevalent item group reported in the third trimester was the UDI. And item number 15 asking about urinary frequency (Do you usually experience frequent urination?), was the most abundant with 65% of patients reporting increased urinary frequency.

At 3 months post-partum only 37 women (31.6%) of the original participants could be reached for the second interview. Many of the phone numbers provided had been disconnected with no forwarding number, and a few of the participants declined to farther participate. The interview was conducted by telephone using the PFDI questionnaire in addition to a question regarding utilization of physiotherapy services.

Because of the high loss to follow-up demographic and clinical characteristics were compared among the women who were recruited to the study, between those who participated in the second interview and those who did not. No significant differences were noted between the groups (data not shown).

Table 1
The demographic and clinical characteristics of the study group.

Characteristic	Mean ± SD	Maximum	Minimum
Maternal age	30.84 ± 5.05	44	19
Parity	2.66 ± 2.08	14	1
Birth weight (kg)	3.344 ± 0.628	6.405	2.204
	Frequency	Percent	Percent of vaginal delivery
Mode of delivery			
Vaginal delivery	85	72.6%	
Instrumental delivery	5	4.3%	
Elective cesarean delivery	16	13.7%	
Emergency cesarean delivery	11	9.4%	
Episiotomy	9	7.6%	10.0%
Perineal tear	28	23.9%	31.1%
Grade 1	11	9.4%	12.2%
Grade 2	17	14.5%	18.9%
Grade 3–4	0	0	0

Data are presented as mean ± SD or frequency and percent when appropriate.

Interestingly, none of the women who were interviewed 3 months after delivery utilized physiotherapy treatment services, even though they had reported PDF symptoms.

The results of the post-partum PFDI-20 questionnaire are presented in Table 2. The most prevalent item group that was reported in the post-partum was the CRADI. Item number 7 (Do you feel the need to strain too hard to have a bowel movement?) asking about straining during defection was the most abundant with 31.5% of patients reporting increased straining efforts. Fig. 1 presents a comparison of the results of the third trimester and post-partum PFDI-20 questionnaires.

A significant difference was noted in almost half (9/20) of the items in the PFDI between the two periods (Table 2). There was a mixed trend in the changes noted. While some items improved in the puerperium as compared with late pregnancy others have worsened. This mixed trend was evident in the POPDI and CRADI item groups, while in the UDI item group apart from one item, all other items showed improvement in the puerperium as compared with late pregnancy.

We performed a multivariable analysis in order to investigate any associations between the PFDI items at the third trimester and post-partum period with obstetrical characteristics. Maternal age, parity, mode of delivery, birth weight, episiotomy and spontaneous perineal tears were included in the analysis. The only statistically significant finding was that at the post-partum follow-up, stress urinary incontinence (SUI) was significantly associated with spontaneous perineal tears at delivery ($p = 0.033$). Other parameters including episiotomy and birth weight were not found to be significantly associated with any of the PFD items.

Discussion

The major finding of our study is that PFD is prevalent both in late pregnancy and in the puerperium. Moreover, mixed trends of improvement and worsening were noticed between these two periods. Regarding the association between PFD and obstetrical characteristics, we were able to find a significant association between perineal tears and SUI 3 months after delivery.

Our findings indicate that UDI items were the most prevalent in women at the end of pregnancy and that these problems seem to spontaneously improve in the puerperium. Many studies state that the prevalence of UI is maximal not postpartum, but rather during the second half of pregnancy with reported rates as high as 60% [1,3,4,17]. Following delivery the reported prevalence is between 6% and 29%. Mason et al. [17] reported a major decrease in the rate of UI from 59% at 34–36 weeks gestation to 31% 8–10 weeks postpartum [17]. Likewise, in our study a 26% decrease was noted in UDI items from 41.8% in late pregnancy to 15.8% in the puerperium. In contrast, a Norwegian study reported that the prevalence of urinary incontinence during pregnancy was 42% and was nearly the same 8 weeks postpartum (38%) representing only a 4% decrease [18]. Although the magnitude of this effect is controversial, there is unity in the observation of spontaneous recovery of urinary PFD symptoms in the puerperium.

The association between pregnancy, labor and delivery, and pelvic floor injury is vastly reported. Pregnancy itself may be associated with some injury, but many think that the main damage occurs during vaginal delivery. Vaginal delivery may cause

Table 2
Results of the third trimester of pregnancy and post-partum period PFDI-20 questionnaires divided according to symptoms into 6 items evaluating POPDI, 8 items evaluating CRADI and 6 items evaluating UDI.

PFDI item		Prevalence within group	Late gestation ($n = 117$)		Prevalence within group	Post-partum period ($n = 37$)		p value
			Frequency (%)	Mean ± SD		Frequency (%)	Mean ± SD	
1	POPDI	29.0%	64 (54.7)	1.38 ± 1.62	12.8%	6 (15.8)	0.35 ± 0.95	0.665
2			45 (38.5)	1.19 ± 1.63		5 (13.2)	0.30 ± 0.78	0.048
3			18 (15.3)	0.32 ± 0.91		3 (8.0)	0.22 ± 0.82	0.002
4			24 (20.5)	0.43 ± 0.96		7 (18.5)	0.54 ± 1.19	0.176
5			46 (39.3)	0.76 ± 1.16		7 (18.5)	0.41 ± 0.86	0.155
6			7 (5.9)	0		1 (2.5)	0.05 ± 0.33	–
7	CRADI	24.2%	42 (35.8)	1.05 ± 1.49	20.7%	12 (31.5)	0.84 ± 1.30	<0.001
8			40 (34.1)	0.62 ± 1.14		11 (29.0)	0.81 ± 1.33	0.031
9			5 (4.2)	0.03 ± 0.16		0	0	–
10			5 (4.2)	0.03 ± 0.16		1 (2.7)	0.08 ± 0.49	0.870
11			34 (29.0)	0.51 ± 1.17		8 (21)	0.51 ± 1.12	0.513
12			34 (29.0)	0.59 ± 1.17		10 (26.5)	0.70 ± 1.22	0.324
13			46 (39.3)	0.68 ± 1.13		14 (37)	0.89 ± 1.27	0.001
14			22 (18.8)	0.46 ± 1.17		7 (18.5)	0.54 ± 1.19	<0.001
15	UDI	41.8%	76 (65.0)	1.76 ± 1.44	15.8%	6 (15.8)	0.49 ± 1.17	0.025
16			50 (42.7)	0.89 ± 1.37		2 (5.3)	0.11 ± 0.52	0.407
17			50 (42.7)	0.95 ± 1.39		9 (23.7)	0.59 ± 1.17	<0.001
18			45 (38.4)	0.46 ± 1.09		6 (15.8)	0.49 ± 1.17	0.019
19			22 (18.8)	0.27 ± 0.80		4 (10.5)	0.24 ± 0.72	0.313
20			51 (43.5)	0.95 ± 1.39		9 (23.7)	0.59 ± 1.17	0.236

POPDI: pelvic organ prolapse distress; CRADI: colorectal anal distress; UDI: urinary distress.

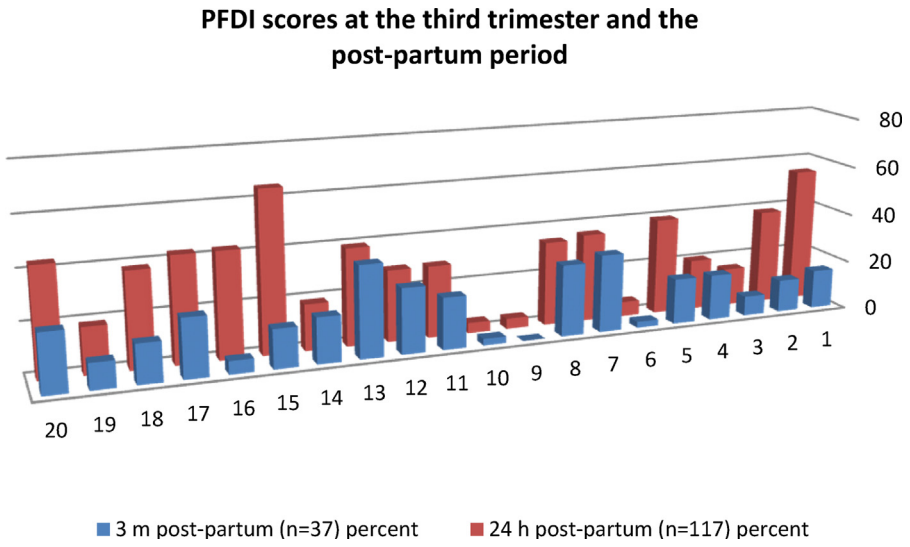

Fig. 1. PFDI scores at late gestation and the post-partum period.

denervation of the pelvic floor as well as direct injury to muscles and connective tissue [19]. However, others call the predictions given by the trauma theory into question [12]. According to the trauma theory, these injuries may lead to the development of PFD including SUI, CRD, voiding difficulties, and/or POP as well as sexual dysfunction. Previous studies showed a correlation between various obstetric risk factors and the development of these symptoms, however, there is no consensus regarding the relative contribution of the different parameters. Moreover, the apparently protective effect of cesarean section is questionable [19].

SUI is the most common UI in women and its association with obstetrical characteristics is extensively debatable. In our study a decrease was noted post-partum both in the rate of SUI and in the rate of urge incontinence, with a more profound decrease noted in SUI. SUI is greatly influences from the increased intra-abdominal pressure seen in late pregnancy. It should be noted that although an improvement in the rate of SUI was recorded it was prevalent affecting more than 15% three months after delivery. Increased urinary frequency was the most common complete of women in late pregnancy and was significantly reduced post-partum. This could be attributed to the increased mechanical pressure the gravid uterus places on the bladder and the significant relief thereafter. In the present study, the multivariate model reviled that at the 3 months follow-up, SUI was significantly associated with spontaneous perineal tears at delivery ($p = 0.033$). No other obstetrical characteristics were found to be associated with SUI.

Our findings indicate that the prevalence of CRD is similar to that described in the literature [5,20,21]. In our study stool incontinence rates were low and remained so in the puerperium. However, flatus incontinence was high and remained high 3 months after delivery. Nevertheless, a decrease was noted in the rate of all CRADI items 3 months after delivery. A large Canadian multi-center cohort study stated that 3 months after delivery 3.1% of women reported incontinence of stool, and 25.5% had involuntary escape of flatus [20]. Many authors recognize risk factors for postpartum fecal incontinence to include among others forceps delivery, nulliparity, macrosomia (birth weight >4 kg), persistent occiput posterior presentation of the fetal head and episiotomy [20,21]. However, in a recent systematic review identifying delivery-related etiological factors for postpartum fecal incontinence, a third- or fourth-degree sphincter rupture was the only etiological factor associated with postpartum fecal incontinence. No association with other postulated risk factors was found including birth weight and instrumental delivery [22]. In our study there were no cases of forceps delivery nor were there any 3–4 degree perineal tears. This may also help to explain the low rates of CRD symptoms in our population.

At the 3 month follow-up a mild but significant change was noted in the CRADI items 7 and 8 (Do you feel you need to strain too hard to have a bowel movement? and Do you feel you have not completely emptied your bowels at the end of a bowel movement?). While patient's reports of need to strain during defecation improved in the puerperium the sensation of incomplete emptying was increased. Likewise, van Brummen et al. [23] reported that defecation symptoms that were already present in pregnancy were highly predictive for reporting symptoms at 12 months postpartum. Fecal incontinence however, was mainly related to anal sphincter lesions [23]. In contrast, Derbyshire et al. [24] found that sensations of incomplete evacuation and time spent defecating were significantly increased during all three trimesters of pregnancy compared with puerperium ($p < 0.05$) [24].

The incidence of POP after childbirth is increasing [25]. POPDI items 2 and 3 in the PFDI questionnaire (Do you usually experience heaviness or dullness in the lower abdomen? and Do you usually have a bulge or something falling out that you can see or feel in the vaginal area?) were highly prevalent during late pregnancy in our cohort and reached close to 30% of participants. At 3 months post-partum, a significant improvement was noted. It is understandable when taking in account the strain placed on the pelvic floor by the gravid uterus at advances gestation and the dramatic relief thereafter. In contrast, a study from North Carolina, USA demonstrated a significant increase in POP following childbirth [25]. These differences may be explained by differences in studied populations, study design and evaluation methods.

A third- or fourth-degree perineal tear was found to be a significant risk factor for post-partum PFD and specifically CRD [22,23]. In our study, about 31% of patients with vaginal or instrumental delivery suffered a spontaneous perineal tear. These were only grade 1–2 tears. No 3–4 degree tears were noted in our cohort. It is probable that not only the presence of a tear poses risk to the pelvic floor but rather it location. Unfortunately, we do not have this information regarding the tears in our cohort. None of the other maternal or obstetrical characteristics that were evaluated in the multivariate analysis including maternal age, parity, lactation,

episiotomy or neonatal macrosomia were independently associated with PFDI.

The role of antenatal and post-partum pelvic floor training strategies and physiotherapy in order to reduce rates of PFD has been widely discussed in the literature and remains uncertain. Reilly et al. [26] found that antenatal supervised pelvic floor exercises are effective in reducing the risk of post-partum stress incontinence in primigravid women with bladder neck mobility [26]. In contrast, a recent study from Norway, post-partum pelvic floor muscle training had no effect on POP in primiparous women [27]. In our study, all patients at enrolment received an explanation about the advantages of post-partum physical therapy, a service that in Israel is included in the health package. At the 3 month follow-up women were asked regarding utilization of these services and interestingly, none of the women have including women that suffered from PFD symptoms. More randomized controlled trials are needed before strong conclusions can be drawn on the role of antenatal and post-partum pelvic floor training strategies and physiotherapy on PFD prevention and treatment. Moreover, intervention strategies should be developed and further studies are needed in order to investigate reasons for non-compliance and how to increase participation among women in the puerperium.

Our study holds several advantages including its prospective design, the use of validated questionnaires, the evaluation of symptoms as well as their effect on QoL. The study took place at the Soroka University Medical Center which is the sole tertiary center for a population of 700,000 residing in Southern Israel, this enabled us to recruit a heterogeneous population and increase the generalizability of our findings. Finally, to the best of our knowledge this is the first longitudinal study to evaluate late pregnancy and post-partum PFD in an Israeli cohort of women using the PFDI-20.

However, there were some limitations to the study. It is possible that the first 24 h after delivery is not the optimal time for recruitment. It could be that if we would have recruited earlier (during the third trimester) we would have gained women who were too weak or did not feel up to participating in the study. Our study was probably underpowered to evaluate the different obstetrical characteristics, therefore our findings regarding the association between obstetrical characteristics and PFD should be interpreted with caution. Finally, we had a high rate of loss to follow-up at 3 months post-partum only 37 women (31.6%) of the original participants could be reached for the second interview. Other studies have also reported a similar rate of loss to follow-up [1]. We did however compare the demographic and clinical characteristics between those who participated in the second interview and those who did not and no significant differences were noted between the groups.

In conclusion, we have demonstrated that PFD is prevalent both in late pregnancy and in the puerperium. There are mixed trends of spontaneous recovery following childbirth. Different items in the PFDI showed improvement and worsening during the puerperium as compared with late pregnancy. A significant association between perineal tears and SUI 3 months after delivery was noted. Future population based prospective studies reporting the prevalence of PFD in pregnancy and postpartum should focus on distinguishing the different symptoms by type, frequency and impact on QoL and should report prevalence in subgroups defined according to obstetric risk factors. Furthermore, the role of physiotherapy and pelvic floor muscle training during pregnancy and the puerperium should be further evaluated.

Conflict of interest

All authors declare no conflict of interest.

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