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**Does pelvic floor muscle contraction early after delivery cause perineal pain in postpartum women?**

**Hedwig Neels (1,2), Stefan De Wachter (2,3), Jean-Jacques Wyndaele (3), Michel Wyndaele (3), Alexandra Vermandel (1,2)**

1. Department Rehabilitation Sciences and Physiotherapy, University of Antwerp, Wilrijk, Belgium

2. Department of Urology, Antwerp University Hospital, Edegem, Belgium

3. Department of Urology, University of Antwerp, Wilrijk, Belgium

**CORRESPONDING AUTHOR:**

Dra. Hedwig Neels Faculty of Medicine and Health Sciences, Revaki. Campus Drie Eiken - Lokaal D.S.022. Universiteitsplein 1 - 2610 Wilrijk – Belgium

hedwig.neels@uantwerpen.be

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**CONTRIBUTION TO AUTHORSHIP:**

H Neels: Project development, data collection, management data analysis, manuscript writing

S De Wachter: Project development, manuscript editing

JJ Wyndaele: Project development, manuscript writing/editing

M Wyndaele: management data analysis, manuscript editing

A Vermandel: Project development, manuscript writing/editing

**ABSTRACT Objective(s), Study Design, Results and Conclusion(s).**

**Objective:** Pelvic floor muscle training is effective and necessary in the prevention and treatment of pelvic floor dysfunction during pregnancy and after childbirth. But because of the high prevalence of perineal pain observed in women after childbirth, many women and caregivers fear to start pelvic floor muscle training immediately after childbirth. However, it is unknown whether pelvic floor muscle contractions (PFMC) provoke perineal pain in women shortly after childbirth. Therefore, the main objective is to study whether PFMC performed immediately after childbirth are painful or not.

**Study design:** Observational longitudinal study. Perineal pain was assessed (1-6 days and 9 weeks postpartum) using a visual analogue scale (VAS 0-10) during PFMC and during several activities of daily living (ADL), during micturition and defecation. Descriptive statistics, Wilcoxon and McNemar tests were used.

**Results:** A total of 233 women participated (148 primiparous and 85 multiparous). Immediately postpartum the prevalence and intensity of pain during ADL (73%; VAS 4.9 ( $\pm 2.3$ )), micturition (47%; VAS 3.4 ( $\pm 1.7$ )) and defecation (19%; VAS 3.6 ( $\pm 2.2$ )) were significantly higher (all  $p < 0.000$ ) than during PFMC (8%; VAS 2.2 ( $\pm 0.9$ )). At 9 weeks postpartum, 30% experienced perineal pain during sexual intercourse (VAS 4.6  $\pm$  2.3) and 18% during defecation (VAS 4.7  $\pm$  2.3), but none during PFMC.

**Conclusion:** Perineal pain is highly prevalent immediately after childbirth during ADL, micturition and defecation, but not during PFMC (only 8%). In case perineal pain occurs during PFMC, the intensity of pain is low (VAS 2). These results show that fear of perineal pain should not discourage women to start pelvic floor muscle training shortly after childbirth.

**KEY WORDS** perineal pain, pelvic floor muscle training, postpartum, pelvic floor muscle contraction

## **ABBREVIATIONS**

PFMT Pelvic floor muscle training

PFMC Pelvic floor muscle contractions

UI Urinary Incontinence

VAS Visual analogue scale

## **INTRODUCTION:**

Pregnancy and childbirth are main risk factors for pelvic floor dysfunction such as urinary incontinence (UI), anal incontinence, pelvic organ prolapse and sexual problems (1, 2).

Pelvic floor muscle training (PFMT) is known to be effective in the prevention and treatment of pelvic floor dysfunction during pregnancy and after childbirth (3, 4), and therefore has an important role in the peripartum period. Muscular reinforcement during perineal rehabilitation reduces urinary stress incontinence and anal incontinence (5). PFMT after delivery should at first be focused on restoring voluntary contraction of the weakened musculature (6).

Pregnancy and delivery are also the most common risk factors for perineal pain in the early postpartum period. Perineal pain is defined by the International Continence Society as the complaint of pain felt between the posterior fourchette (posterior lip of the introitus) and the anus (7, 8). Some researchers define perineal pain in a broader region: as any pain occurring in the perineal body, the area of muscular and fibrous tissue, which extends from the symphysis pubis to the coccyx (9).

Recent research found a high prevalence of perineal pain postpartum, ranging from 74% to 90%, with 37% reporting moderate or severe pain (10, 11). Evidence shows that perineal tissue damage is the most important risk factor for perineal pain postpartum. Perineal tissue damage can occur with diverse birth interventions including episiotomy, forceps, vacuum extraction, prolonged expulsive period and newborn characteristics including birth weight (12), head circumference and position of the baby at birth (13, 14).

Perineal pain can impact a woman's daily activities including sleep patterns, urinary and bowel function and practical care of her infant (15, 16). Although preventive PFMT has an important role in peripartum pelvic floor dysfunction, the prevalence of perineal pain during PFMT after delivery has never been studied before. Recent research revealed that PFMT started early after obstetrical anal sphincter injuries (within 30 days) reduces anal incontinence significantly compared to PFMT given

within 6 to 8 weeks postpartum (6). But many women and caregivers are cautious or even restrained to start PFMT early after childbirth because of the pain they complain about.

The aim of this study is to investigate whether and to which extent pelvic floor muscle contraction (PFMC) provokes perineal pain in women shortly after delivery and nine weeks later. Secondary we will register which activities of daily living provoke perineal pain shortly after delivery and nine weeks later. And also the influence of parity, delivery methods, newborn anthropometric characteristics, pain medication and prepartum pelvic floor dysfunction on the prevalence of perineal pain will be investigated.

## **MATERIALS AND METHODS**

### *Design*

Observational longitudinal survey. Study subjects were recruited within 1 to 6 days after delivery at the maternity ward, University Hospital Antwerp. A good knowledge of the Dutch, French or English language was a prerequisite for inclusion. Exclusion criteria were the presence of an indwelling bladder catheter. Written informed consent was obtained from all participating women. The study was approved by the local ethics committee (BE300201318334).

### *Questionnaire immediately after delivery*

The date of delivery, characteristics of the mother and newborn, number of parity and gravidity, and characteristics of most recent delivery (perineal trauma, use of epidural analgesia and method of delivery) were obtained through medical records of the women. Participants were asked whether they ever experienced urinary incontinence before and during pregnancy (yes or no question).

The postpartum complaints which were evaluated consisted of use of abdominal pressure during voiding (straining), pain during micturition and defecation and the intensity of this pain (visual analogue scale (VAS) from zero to ten, zero = no pain, ten = worst pain ever). The subjects were also

questioned regarding the use of laxatives and pain medication. Finally, subjects were invited to point the localization of the perineal pain on an illustration figure of a vulva.

Validation of the anamnestic questions and physical exam, as described, has been done (first by peers, then in a pilot sample of 22 women, of which were not included in the sample).

#### *Clinical examination immediately after delivery*

The clinical examination was performed by a physiotherapist, specialized in PFMT. Activities with a risk of provoking pain were assessed: activities of daily living (ADL) and pelvic floor muscle contractions. Perineal pain was scored on a VAS (0-10) during: sitting on a chair, standing up from a chair, standing, adduction-abduction in supine position, turning in bed from supine to prone position and coughing. Subjects were also asked to perform a Valsalva maneuver (Valsalva pushing: women were asked to strain as if they wanted to make stool and Valsalva blowing: women were asked to breath out forcibly while the mouth and nose were firmly closed). Then, women were, undressed, positioned in the lithotomy position. First assessment of the dermatomes (L1-S5) was performed using a cotton swab. Second, visual observation of the perineal area and vagina was performed during PFMC. A normal analytic PFMC was defined as a ventral and inward displacement of the perineum (17, 18). Women were asked to perform three consecutive contractions and relaxations. Women who did not show correct PFMC after three consecutive tries received verbal instructions on how to contract the pelvic floor muscles and were then re-evaluated. Perineal pain was again scored on VAS.

#### *Questionnaire around nine weeks after delivery*

All participants were contacted by phone or by email at around nine weeks after delivery.

Women were asked if they still experienced perineal pain (VAS and location). If they felt no pain at the time of the interview, they were asked to recall if they had experienced perineal pain after the first part of the study, how long that pain had lasted, where exactly they had felt it and how intense

that pain had been (VAS).

Women were also asked if they felt pain during micturition and defecation and during sexual intercourse at that moment, nine weeks after delivery. Perineal pain during ADL and Valsalva maneuver was assessed again with VAS scores.

Finally, study subjects were asked if they had performed the PFMC exercises as they had been taught on the maternity ward. And if they felt perineal pain during PFMC performed at nine weeks postpartum, during the assessment. Immediately after childbirth they were advised to perform at least two times per day, 20 contractions in a row, each day. During the data analysis, a minimum of 20 PFMC, at least four days a week was used as definition for “performing regular exercises”.

#### *Statistical analysis*

Equivalence/non-inferiority test was performed to the hypotheses that the prevalence of perineal pain during PFMC immediately after delivery would be less than 5% (actual proportion= 0.02). The objective to include 230 participants was determined. Statistical analysis was carried out using SPSS version 22.0 for Windows. Descriptive statistics, Wilcoxon, McNemar and Chi-Square tests were used. Non parametric tests were used to compare VAS scores between groups.

Results are given as number (n), percentage of whole group, mean +/- standard deviation (M ( $\pm$ SD)).

## **RESULTS**

Two hundred thirty-three women (148 primiparous and 85 multiparous) participated in the study (M  $2.4 \pm 1.2$  days postpartum) immediately after delivery. Hundred ninety-nine of them agreed to participate also in the second part of the study, approximately nine weeks after delivery. Eight women were excluded for the second part because they were not able to perform an analytic PFMC immediately after childbirth. Mean age of the participants was  $30.4 \pm 4.4$  years old; characteristics are presented in Table 1. Nine women (4%) delivered twins.

A descriptive overview of urinary incontinence, primiparity, use of epidural anesthesia, method of delivery, perineal trauma and the use of painkillers can be found in Table 2. The clinical evaluation of perineal sensation using the Q-tip test for light touch was normal in all participants in all dermatomes.

The prevalence and intensity of perineal pain immediately after childbirth are presented in Table 3. Pain was significantly less prevalent during PFMC ( $p < 0.01$ ) and less intense (VAS,  $p < 0.05$ ), compared to the pain felt during ADL activities and micturition, Table 3.

Most women who felt perineal pain localized it between the posterior fourchette (posterior lip of the introitus) and the anus ( $n = 113$  (70%)), although a broader region (urethra, around the anus, around the vagina, around the labia) was also depicted by 100 participants.

Primiparous women and women with episiotomy or a perineal rupture suffered significantly more from perineal pain shortly after delivery. Women with an intact perineum after vaginal delivery and women who had a caesarian section experienced significantly less perineal pain. The use of painkillers had no significant influence on the prevalence (Table 2).

One hundred ninety-nine women participated in the second part of the study. They completed the questionnaire after  $9.3 \pm 2.5$  weeks. Thirty (14%) women still experienced occasionally perineal pain at the time of the questionnaire (M VAS  $\pm$ SD:  $4 \pm 2.3$ ). Of them, twenty-five women localized their perineal pain between the posterior lip of the introitus and the anus. The remaining 5 women felt pain in a broader area (around the anus).

One hundred seven (51%) women recalled that they had experienced perineal pain during  $19.4 \pm 13$  days after delivery, but were pain free at the time of the 9-week questionnaire.

The prevalence and intensity of perineal pain during PFMC, micturition, defecation and during sexual intercourse is presented in Table 3. Most women ( $n = 178$  (84%)) had performed PFMC regularly between the first and second evaluation.

## COMMENT

The results of this study indicate that pelvic floor training shortly after delivery is not painful in most women, even if many report pain during ADL, micturition or defecation. Those women who experienced pain reported a lower level of pain during PFMC than during ADL, micturition and defecation. Perineal pain, immediately after delivery was significantly more prevalent in primiparous women and women with perineal trauma. None of the participants felt any pain during a PFMC performed at nine weeks postpartum.

The importance of perineal trauma and primiparity in the risk for perineal pain has already been shown in previous research (10, 14). But the absence of pain during PFMC has not been previously established.

Previous research also revealed that sitting, walking, micturition and movement into and out of bed could provoke perineal pain (10, 19), similar to our results. During all these activities pressure on the affected area can be expected. Valsalva pushing and blowing were less painful, although they increase the intra-abdominal and intrapelvic pressure. One reason could be that the subjects were cautious and did not push or blow hard enough to reach the pain threshold, or perhaps internally augmented pressure is less painful compared to external pressure such as sitting on a chair.

Perineal pain postpartum can be provoked by ischemia/reperfusion injury (20), by nerve damage (21) and by referred pain from nerve roots, but also from muscle damage or damage and edema of the pubic bone, the skin and superficial tissues (22). Our study evaluated the occurrence of perineal pain, and was not designed to explore the mechanisms behind it. It is noteworthy that contraction of the pelvic floor muscles was not painful while ADL, micturition and defecation that provoke pressure and tension in the pelvic floor were. The clinical superficial sensory evaluation indicated that the

somatic sensation was not disturbed overall, although nerve damage from compression or tension cannot be excluded.

Morkved and Bo have shown that PFMT pre- and postpartum is successful in preventing and treatment of UI when supervised training is followed, and up to six months after delivery (3, 4). It has been suggested that all pregnant and postpartum women with or without UI after delivery should perform PFMC (23). Although recent research performed in the Netherlands revealed that less than half of all pregnant women received PFMT in an antenatal and approximately one in ten in a postnatal pregnancy course (24). And a Belgian study found that 75% of peripartum women felt insufficiently informed about PFMT (25), and a sparse knowledge about the pelvic floor in nulliparous women (24).

The number of institutional deliveries worldwide is high (26). Also, in most home deliveries, a medical care giver is present. Thus, it would not be too difficult for healthcare providers to teach women the advantages and the technique of PFMT immediately after delivery, without fear for pain, as shown in our study. Pelvic floor dysfunction should be explained, because these intimate problems are often a taboo to talk about. For example, we first gave a brief explanation about the anatomy, functions and possible dysfunctions of the pelvic floor muscles. Secondly, we explained how to perform PFMC and provided oral feedback after visual observation. Their first trial of PFMT after delivery should be focused on proprioception and feeling their own muscles contract again after delivery, despite the pain felt during ADL. Boyle et al. also suggested that women should be encouraged to continue PFMT during and after every pregnancy, and once their families are complete. Most of our participants (84%) reported performing PFMT after the advice of the physiotherapist they had seen on the maternity ward. Although, if women would not have been educated properly shortly after childbirth, we think that many would never get informed afterwards. In that case many would never have benefitted from the preventive value of PFMT.

The results showed that micturition immediately after childbirth provoked perineal pain in almost half of the subjects (47%), while defecation caused pain in only 19%. These higher numbers may be due to irritation of the urine on superficial wounds from delivery. We found that pain during micturition was gone after approximately nine weeks. To the contrary, the prevalence of perineal pain during defecation only diminished by 1% and the VAS score increased by one point. Further research should focus on these prevalent pain complaints during defecation in the postpartum period. Perhaps women are straining to achieve a bowel movement. The consistency of the stool can change as a result of hormonal influences (27). It is also possible that some of the subjects feel pain due to dyschezia or coccygodynia. The prevalence of postpartum constipation has been estimated to be up to 24% at three months postpartum (27). Lactulose has shown to be effective in treating these types of constipation (28). However, it would also be interesting to study the influence of the pelvic floor muscle activity on constipation and pain during defecation.

Perineal trauma causing pain that persists beyond the immediate postpartum period may also have longer-term effects, such as painful sexual intercourse for up to 18 months after giving birth (29, 30). The results of the present study also indicate that sexual intercourse and defecation were provoking perineal pain at approximately 9 weeks postpartum in 30% and 18% of our group, respectively. In the present study, the most important fact was that none of the subjects felt perineal pain during a PFMC.

The limitation of the present study is that some data were self-reported, although most were obtained through medical records. However, the use of a visual analogue scale for pain in the pelvic floor is valid and reliable (31). The prevalence of perineal pain is rather high, but the VAS scores are relatively low. This could be due to the common use of painkillers prescribed on the maternity ward. And the scant number of forceps delivery, limit the results for these patients. Although performing PFMT short after forceps delivery seems to have more advantages than performing these exercises later in the postpartum period (6). And, finally, we have not used diaries

to collect data during the period in between the first and the second evaluation. Therefore only the data of the first evaluation and the data about pain felt at the moment of the second questionnaire are valid. Recall bias could have influenced the pain scores of the intermediate period.

To conclude, perineal pain is highly prevalent immediately after childbirth during ADL, micturition and defecation, but not during pelvic floor muscle contraction. If pain occurs during pelvic floor muscle contraction, its intensity is low. Starting pelvic floor muscle training shortly after childbirth is possible in the majority of women and fear of perineal pain should not be an obstacle. Further research should be done to reveal if initiation of PFMT immediately after childbirth may reduce the prevalence of pelvic floor dysfunction later postpartum.

#### CONFLICT OF INTEREST

The authors declare that there is no conflict of interests regarding the publication of this paper.

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**Table 1. Characteristics of Mother (N= 233) and Newborn**

| <b>Mother</b>                          |        |       |       |       |        |
|--|--------|-------|-------|-------|--------|
|  | M      | SD    | Min   | Max   | SEM    |
| Age                                    | 30.3   | 4.4   | 19.4  | 42.5  | 0.29   |
| Height (cm)                            | 167.3  | 0.1   | 150.0 | 185.0 | 0.0040 |
| Pre pregnancy Weight (kg)              | 65.5   | 11.4  | 44.0  | 112.0 | 0.75   |
| Pre pregnancy BMI (kg/m <sup>2</sup> ) | 23.4   | 3.9   | 15.9  | 41.9  | 0.25   |
| Weight-gain (kg)                       | 13.4   | 5.5   | 0.0   | 38.0  | 0.36   |
| Parity                                 | 1.5    | 0.8   | 1.0   | 5.0   | 0.33   |
| <b>Newborn</b>                         |        |       |       |       |        |
| Weight (g)                             | 3155.1 | 663.8 | 760   | 4450  | 43.5   |
| Head circumference (cm)                | 34.4   | 1.9   | 27    | 44.0  | 0.12   |

M=mean, SD = Standard Deviation, Min = minimum, Max = maximum, SEM= standard error of the mean

**Table 2. Influencing factors on the occurrence of perineal pain in 233 women immediately after delivery**

|                     | n    | Prev (%) | No Peripain<br>N=44 | Peripain<br>N=189 | Significant<br>influence<br>(p-value)<br>Chi-Q |
|---------------------|------|----------|---------------------|-------------------|--|
|                     |      |          | n                   | n                 |  |
| UI pre pregnancy    | 44   | 19       | 8                   | 36                | 0.910  |
| UI per pregnancy    | 144  | 63       | 28                  | 116               | 0.737  |
| Primiparity         | 148  | 64       | 22                  | 126               | <b>0.039</b>                                   |
| Epidural anesthesia | 128  | 55       | 25                  | 103               | 0.781  |
| Vacuum delivery     | 45   | 20       | 4                   | 41                | 0.064  |
| Forceps delivery    | 6    | 3        | 1                   | 5                 | 0.888  |
| Caesarian section   | 26.0 | 11       | 16                  | 10                | <b>&lt; 0.001</b>                              |
| Intact perineum     | 59   | 25       | 27                  | 32                | <b>&lt; 0.001</b>                              |
| Episiotomy          | 52   | 22       | 3                   | 62                | <b>0.001</b>                                   |
| Perineal rupture    | 106  | 45       | 15                  | 106               | <b>0.009</b>                                   |
| Painkiller          | 149  | 64       | 33                  | 116               | 0.090  |

Differences between groups of Peripain (occurrence of perineal pain immediately after delivery (2-6 days postpartum) during ADL, micturition, defecation or PFMC) were calculated using Chi-Square test. Level of significance (p< 0.05). N= total number of participants, n= number of participants with a specific influencing factor , UI = urinary incontinence, Prev = prevalence

Table 3. Prevalence and Intensity of Perineal Pain

| Shortly after Childbirth |                |               |            |             |              |  |   |
|--------------------------|----------------|---------------|------------|-------------|--------------|--|---|
|                          | N<br>(missing) | Prev<br>% (n) | M<br>(VAS) | SD<br>(VAS) | Med<br>(VAS) | Difference in Prev of<br>pain with Prev during<br>PFMC (p-value)** | Difference in VAS of<br>pain with VAS during<br>PFMC (p-value)*** |
| <i>During:</i>           |                |               |            |             |              |  |   |
| <b>PFMC</b>              | <b>225 (8)</b> | <b>8 (18)</b> | <b>2.2</b> | <b>0.9</b>  | <b>2</b>     |  |   |
| ADL sit                  | 230 (3)        | 57 (132)      | 3.9        | 2.1         | 4            | <b>0.001</b>   | <b>0.000</b>  |
| ADL standUP              | 218 (15)       | 52 (114)      | 4.4        | 2.2         | 5            | <b>0.001</b>   | <b>0.000</b>  |
| ADL stand                | 229 (4)        | 23 (54)       | 3.6        | 2.0         | 3            | <b>0.023</b>   | <b>0.000</b>  |
| ADL Add-abd              | 221 (12)       | 7 (16)        | 3.7        | 1.8         | 3.5          | 0.068  | 1.000   |
| ADL turn                 | 225 (8)        | 37 (84)       | 4.1        | 2.0         | 4            | <b>0.001</b>   | <b>0.000</b>  |
| ADL cough                | 229 (4)        | 48 (110)      | 4.2        | 2.2         | 4            | <b>0.005</b>   | <b>0.000</b>  |
| ADL int touch            | 154 (79)       | 27 (41)       | 4.6        | 2.3         | 5            | 0.102  | <b>0.000</b>  |
| micturition              | 233 (0)        | 47 (109)      | 3.4        | 1.7         | 3            | <b>0.026</b>   | <b>0.000</b>  |
| defecation               | 130 (103)      | 19 (24)       | 3.6        | 2.2         | 3            | 0.564  | <b>0.002</b>  |
| vasalva blowing          | 227 (6)        | 7 (16)        | 2.2        | 1.6         | 2            | 0.180  | 0.856   |
| valsalva pushing         | 227 (6)        | 13 (29)       | 2.8        | 1.7         | 2            | 0.705  | 0.061   |
| MAX ADL score            | 233 (0)        | 73 (169)      | 4.9        | 2.3         |              |  |   |
| <hr/>                    |                |               |            |             |              |  |   |
| At nine weeks postpartum |                |               |            |             |              |  |   |
| <i>During:</i>           |                |               |            |             |              |  |   |
| PFMC                     | 199 (0)        | 0 (0)         | 0          | 0           | 0            |  |   |
| micturition              | 198 (1)        | 2 (4)         | 3.8        | 2.2         | 4            |  |   |
| defecation               | 198 (1)        | 18 (38)       | 4.7        | 2.3         | 5            |  |   |
| sexual<br>intercourse    | 155 (44)       | 30 (64)       | 4.6        | 2.3         | 4            |  |   |
| MAX ADL score            | 199 (0)        | 0 (0)         | 0          | 0           | 0            |  |   |

N (number of all participants); Prev=Prevalence of Perineal Pain (n = number of participants with VAS> 0). Statistics on VAS scores are calculated only for the sample with VAS>0. ADL sit= sitting on a chair; ADL standUP= standing up from a chair; ADL stand= standing upright; ADL Add-Abd= abduction and adduction of the legs; ADL turn= turning in bed; ADL cough= coughing; ADL int touch= touching/washing intimate zones; MAX ADL SCORE= the highest VAS score that was experienced during ADL; \*\*Wilcoxon test is used to compare the prevalence of pain during ADL, micturition and defecation with pain during PFMC; \*\*\*Mc Nemar test is used to compare the intensity (VAS) of pain during ADL, micturition and defecation with pain during PFMC.