



Original Article

## Knowledge of the pelvic floor in menopausal women and in peripartum women

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**Abstract.** [Purpose] Pelvic floor dysfunction is an important health-care issue, with pregnancy, childbirth, and menopause as the most important risk factors. Insufficient knowledge about pelvic floor dysfunction is the largest barrier to seeking care. The aim of this study was to investigate the level of knowledge and information on pelvic floor dysfunction in peripartum and menopausal women. [Subjects and Methods] The present study was a cross-sectional survey. A valid and reliable questionnaire of 48 items was distributed to 402 women who were pregnant or had recently given birth and to 165 postmenopausal women. All answers were analyzed and interpreted. The study was approved by an ethics committee (B300201318334). [Results] On a VAS scale of 0 to 10, the mean ratings of the peripartum and postmenopausal women concerning their knowledge were 4.38 (SD 2.71) and 4.92 (SD 2.72). Peripartum women held significantly more pessimistic perceptions about the occurrence of postpartum pelvic floor dysfunction. The results showed that 75% of the peripartum women and 68% of the postmenopausal women felt insufficiently informed or want to get better informed. [Conclusion] The results reveal sparse knowledge about the pelvic floor among women of all ages and that a major proportion of them would be interested in more information. Amelioration of common knowledge could improve help-seeking behavior in women.

**Key words:** Pelvic floor dysfunction, Women, Knowledge

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### INTRODUCTION

Pelvic floor dysfunction (PFD) is present in a wide range of clinical conditions, such as urinary incontinence (UI), anal and fecal incontinence (FI), pelvic organ prolapse (POP), pelvic pain syndromes, sexual dysfunction, and defecation problems<sup>1)</sup>. PFD occurs when the pelvic floor muscles (PFMs) are either too weak or too tight or are incorrectly used. Because of its high prevalence, its invalidating effects on quality of life and its impact on health-related economics, PFD is considered an important health-care issue<sup>2)</sup>.

The major known risk factors associated with PFD include pregnancy and childbirth, obesity, menopause, and chronic obstructive pulmonary disease<sup>3)</sup>. Most frequently, vaginal partus and prolonged labor are related to PFD<sup>1, 4)</sup>. Several published guidelines recommend pelvic floor muscle training (PFMT) as a first-line treatment but also as a prevention strategy for PFD<sup>5, 6)</sup>. This type of treatment has become more widely available in many parts of the world, yet the prevalence rates of PFD-related symptoms remain high in adult women, e.g. up to 46% for UI<sup>7, 8)</sup>. Therefore, one can only assume that preven-

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tion and treatment of PFD are not handled as well in women as they could be.

Previous research suggested that insufficient knowledge and misperceptions about PFD are the largest barriers to seeking care<sup>9-11</sup>. Moreover knowledge has been shown to improve compliance with treatment and can induce behavioral changes<sup>12</sup>.

Previously, we observed an important lack of knowledge about PFMs and PFD in young nulliparous women<sup>13</sup>. In this survey, we explored whether the knowledge of women about PFMs and PFD differ with age, pregnancy, parity, and menopause. We also aimed to evaluate whether women are satisfied with the information they received on this subject.

## SUBJECTS AND METHODS

A written cross-sectional survey was conducted amongst a large group of European women who agreed to participate. Two different groups were included. One group consisted of women in the peripartum (PP) period (from the second half of gestation till the first three months after delivery); the other group consisted of postmenopausal (PMP) women over 50 years of age. Purposive chunk sampling was performed<sup>14</sup>: PP women were recruited during the “Baby Boom fair” in Antwerp (the largest fair for future and young parents), during baby swimming classes, and during stock sales of maternity wear and baby clothes. PMP women were recruited during a lecture organized by “Actual Thinking”, a regional association of pluralistic women.

Exclusion criteria were health-care training and lack of Dutch proficiency. Participants filled in the questionnaire immediately after receiving it and returned it immediately after filling it in.

The Human Research Ethics Committee of the University Hospital of Antwerp (Belgium) approved the study (B300201318334); data were recorded anonymously, and written informed consent was obtained from all the participants.

A literature search could not identify existing psychometrically tested questionnaires that could answer the research questions of the current study. Therefore, a new questionnaire was developed, through item generation, reduction, and “sampling to redundancy”, according to “the Delphi process”<sup>14, 15</sup>. The questionnaire was based on that developed for nulliparous women<sup>13</sup>, though 5 questions were added to collect data about gravidity, parity, and menopause. The questionnaire consisted of 48 questions: 5 on demographic characteristics, 5 on gravidity and parity, 1 on menopause, 6 on PF structure and function, 12 on PFD and risk factors, 3 on sexual (dys)function, 4 on PFT, 5 on education and gathering of information about this topic, and 1 on worries about PF. A female body figure was included to evaluate topographical knowledge (Appendix 1).

The design, wording, form, and order of questions can affect the type of responses obtained; thus careful design was used to minimize bias in the results<sup>16</sup>. Questions were phrased in a socially and culturally sensitive manner, avoiding complex terminology. Succinct and unbiased response formats, “open” (free) and “closed” (structured) text<sup>15</sup>, were used (depending on the information we intended to gather). Indecisive response options (e.g., “I don’t know” and “other”) were included in order to enhance the response rates<sup>15, 17</sup>.

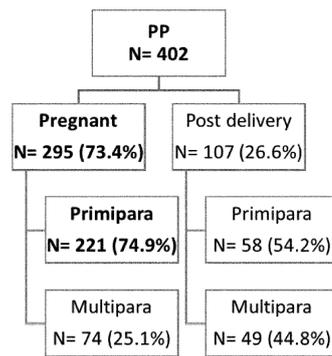
Validity was examined by collecting expert opinions from 4 involved experts (2 urologists, 1 pelvic floor therapist, and 1 gynecologist), and 3 independent experts (a gynecologist, a gastroenterologist, and a general practitioner). The questionnaire was evaluated for face and content validity. A pilot study was performed among the target population (22 volunteers) to evaluate whether respondents interpreted questions in a consistent manner<sup>18</sup>, to judge the appropriateness of each included question, and to record the time required to complete the questionnaire.

Descriptive statistics were generated in IBM SPSS Statistics 20.0 for Windows (IBM Corp., Armonk, NY, USA). Stability and validity testing were performed by using Kappa statistics and intraclass correlation coefficients (ICC) to define agreement for each question. The  $\chi^2$  test was used to analyze the differences between groups, and the Kruskal Wallis test was used for scale parameters. To account for multiple testing, the significance level was set at 0.001.

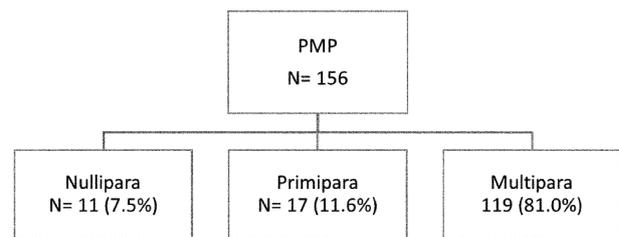
## RESULTS

Test-retest reliability: Sixteen participants completed the questionnaire a second time after 2–4 days. The k value was over 0.80 for 86% of the questions, indicating perfect agreement, and 14% of the questions had a k value between 0.61 and 0.80, indicating substantial agreement. For the one item about knowledge (a visual analogue scale), there was high agreement (ICC single measures 0.92, average measures 0.96) between test-retest answers. Assessment of content and face validity indicated that the questions were well interpreted and gave an accurate measurement of the concept and that the content assessed all fundamental aspects of PFMs and PFD. All women returned the questionnaire, giving a response rate of 100%. The time required to complete the questionnaire ranged from 10 to 20 minutes.

Demographic characteristics and gravidity-parity: A total of 402 PP women (mean age 29.8; 19 to 43 years old) and a total of 156 PMP women (mean age 65.3; 50 to 86 years old) were included (Figs. 1 and 2). The highest achieved degree of education was bachelor’s or master’s degree in 270 (67%) PP women and 95 (62%) PMP women, high school in 126 (31%) PP women and 55 (36%) PMP women and elementary school in 5 (1%) PP women and 3 (2%) PMP women. The educational degree in the two groups did not differ significantly ( $p=0.461$ ). All PMP women were of European nationality, as were the majority (99%) of the PP women. Most PP women were Caucasian (385, 96%); 7 (2%) were Asian, and 3 (0.7%) were black. Most PMP women were Caucasian (151, 99%); one PMP woman was black. The majority of the PP women (295 women, 73%) were on average 23 weeks (SD 8.0 weeks) pregnant, and 221 of them were pregnant for the first time (nulliparous



**Fig. 1.** PP women distributed by current status of pregnancy/post delivery and their number of deliveries (PP, peripartum; N, number of participants)



**Fig. 2.** PMP women distributed by their number of deliveries (PMP, postmenopausal; N, number of participants)

pregnant women). All PMP women declared that they were in the postmenopausal period. Gravidity and parity (G-P) differed significantly ( $p < 0.001$ ) between PP and PMP women. PP women had been pregnant once on average (mean  $1.05 \pm 1.88$ ), and the mean parity was  $0.67 (\pm 0.88)$ ; PMP women had a mean gravidity of  $2.8 (\pm 1.60)$  and mean parity of  $2.54 (\pm 1.29)$ . In PMP women, a significantly higher number of episiotomies (PP women  $0.16 \pm 0.44$ ; PMP women  $1.17 \pm 1.24$ ;  $p < 0.001$ ) and instrumental vaginal deliveries (PP women  $0.010 \pm 0.099$ ; PMP women  $0.099 \pm 0.55$ ;  $p = 0.001$ ) were performed.

**Pelvic floor structure and function:** Differences in knowledge between women based on difference in parity (or experience) and difference in age shown in [Table 1](#). Most PP women (351, 88%) and most PMP women (140, 93%) knew that the PF contains muscles. One-third of PP and PMP women answered that the PF also includes bones, joints, and tendons and ligaments. Furthermore, 75 (51%) PMP women also thought the PF includes arteries and nerves, which was significantly more ( $p < 0.001$ ) than the number of PP women (125, 31%). The majority of all participants (370, 92%, PP women; 142, 91%, PMP women) located the PF correctly on the figure of the female body. On the other hand, 30 (8%) PP women and 9 (9%) PMP women located the PF in the abdomen (above the os ileum) or at the caput femoris.

The closure function (181 PP women, 45%; 64 PMP women, 41%) and support function (193 PP women, 48%; 90 PMP women, 58%) were known best. No significant differences between groups were found. Eight (2%) PP and 13 (8%) PMP women knew about the sexual function ( $p = 0.005$ ), and 33% ( $n = 133$ ) of PP women and 19% ( $n = 30$ ) of PMP women answered that they did not know what the PFMs do or why we need them ( $p = 0.003$ ).

Almost all participants were aware that PFMs could be consciously contracted (380 PP women, 94%; 143 PMP women, 97%). A significant larger proportion (73%,  $n = 114$ ) of PMP women were aware of the squeezing and lifting movement that the PFMs normally makes during an analytic contraction, whereas to 241 (60%) PP women ( $p < 0.001$ ) were aware of this.

A great portion of the women (246 PP women, 61%; 61 PMP women, 43%) did not know how many normal anatomical openings there are in the female PF. Only 72 (18%) PP women and 46 (33%) PMP women answered “three” and were able to name them correctly. No significant differences between PP and PMP groups were found, although [Table 1](#) does indicate that nulliparous pregnant women knew significantly less.

**Knowledge of PFD:** The answers for the questions about the causes of PFD are shown in [Table 1](#). PMP women answered significantly more frequently that obesity and constipation can cause PFD. The results for the questions about the occurrence of PFD are also shown in [Table 1](#). Significant differences between groups were found for the answers for the following questions: “Is it normal that the pelvic floor muscles are not as strong after childbirth as before?” (more PP women answered “yes”), “Is it normal that a healthy woman experiences pain in the pelvic floor after childbirth?” (more PP women answered “yes”), “Is it normal that a healthy woman occasionally loses urine after childbirth?” (more PP women answered “yes”), “Is it normal that an average women experiences pain during intercourse after childbirth?” (more PP women answered “yes” at one month postpartum, and more PMP women answered “I don’t know” at 6 months postpartum). A significant greater percentage of PP women answered that UI and pain in the pelvic floor are consequences to expect of a vaginal delivery ([Table 1](#)).

Most participants in both groups (203 PP women, 71%; 69 PMP women, 87%) thought that a perineal rupture causes more damage to the PFMs than an episiotomy. Most of them answered that it is “the vagina” that tears during a perineal tear. Furthermore, 90% ( $n = 250$ ) of PP women answered that a vaginal delivery causes more damage to the PFMs than a caesarean, which was a significantly greater portion compared with the proportion of PMP women (77%,  $n = 52$ ;  $p < 0.001$ ). A significant difference between groups was found for the knowledge of POP: for 296 (74%) PP women and 76 (49%) PMP women ( $p < 0.001$ ) had no knowledge of POP. Finally, 19% ( $n = 76$ ) of PP women and 36% ( $n = 55$ ) of PMP women were able

**Table 1.** Differences in knowledge between women based on the difference in parity (or experience) and difference in age

Item/question	Group	N
<b>Knowledge of PFD</b>		
Number of openings in PF=3**		
NulliP P	221	Correct, 28 (13%); UK, 151 (68%)
MultiP PP	181	Correct, 44 (24%); UK, 95 (53%)
PMP	140	Correct, 46 (33%); UK, 0 (0%)
Causes of PFD: vaginal delivery**		
NulliP P	221	116 (53%)
MultiP PP	181	138 (76%)
PMP	146	80 (55%)
Causes of PFD: constipation**		
NulliP P	221	15 (7%)
MultiP PP	181	20 (11%)
PMP	145	36 (25%)
Fear: for UI (yes answers) / no fear for PFD at all**		
NulliP P	221	51 (23%)/131 (59%)
MultiP PP	181	81 (45%)/68 (38%)
PMP	156	89 (57%)/44 (28%)
Occasional UI normal? (yes answers)		
NulliP P	221	27 (12%)
MultiP PP	181	17 (9%)
PMP	150	25 (17%)
SUI normal? (Yes answers)		
NulliP P	221	43 (20%)
MultiP PP	181	29 (16%)
PMP	151	36 (24%)
Precautionary pad normal? (yes answers)		
NulliP P	220	94 (43%)

**Table 1.** Continued.

Item/question	Group	N
	MultiP PP	181
	PMP	149
Diminished force of PFM after delivery? (yes answers)**		
	NulliP P	219
	MultiP PP	178
	PMP	152
Consequences of pregnancy and delivery: UI**		
	NulliP P	221
	MultiP PP	181
	PMP	156
Consequences of pregnancy and delivery: stool problems**		
	NulliP P	221
	MultiP PP	180
	PMP	156
Consequences of pregnancy and delivery: flatulence**		
	NulliP P	221
	MultiP PP	181
	PMP	156
Consequences of pregnancy and delivery: perineal pain**		
	NulliP P	221
	MultiP PP	180
	PMP	156
Complaints of pain/ UI/ FI/ dyspareunia after delivery: immediately PP/1 month PP/6 months PP		

NulliP P and MultiP PP give similar answers, while PMP expect significantly (\*\*p<0.001) less complaints immediately PP and 1 month PP; at 6 months PP, no significant differences between groups were found (for questions 23–26, see Appendix 1).

to describe which organs could descend in the pelvis.

Sexual (dys)function: No significant differences were found between groups (Table 1). A greater percentage of PMP women answered “yes” while a greater percentage of PP women did not know whether UI during sexual intercourse is normal.

Pelvic floor therapy: No significant difference was found between PP and PMP women in terms of the percentage of women that had ever received pelvic floor therapy (PFT), both being 24%, although results in Table 1 show that PFT was mostly received after the first pregnancy. Nulliparous pregnant women received significantly less PFT. Only those women in the two groups who had received PFT answered that they were aware of the current treatment strategies.

Education and gathering of information: On a VAS scale of 0 to 10 (0, no knowledge; 10, very high knowledge), the mean ratings of the PP and PMP women for their general knowledge about the PF were 4.38 (SD 2.71) and 4.92 (SD 2.72) respectively. The Kruskal-Wallis test revealed a significant difference of p<0.001. Half of the PP women (n=201, 51%) and 61 (43%) of the PMP women never received information about the PF. Table 1 shows a significant difference in received information between nulliparous women who were pregnant for the first time and parous women. There was no significant difference between the proportion of currently pregnant multiparous or post-delivery women who had been informed and the PMP women who had experienced their peripartum period years previously.

Only 14/195 PP women had received PFM information before pregnancy, such as during yoga or Pilates classes, back school, or sporting activities. IN the informed PP women, 93% (n=181) of the informed PP women received the information during their pregnancy or after their delivery. In contrast, 27/80 informed PMP women (34%) received information during their peripartum period. This means that the majority of this group (n=53, 66%, received information about PF in their PMP period and thus at a higher age. A large number of women were interested in more information on the topic (75% of PP women and 68% of PMP women). No significant difference was found between the PP and PMP groups.

**Table 1.** Continued.

Item/ question	Group	N	
<b>Knowledge about sexual (dys)function related to the PFMs</b>			
Do the PFMs play a role in orgasm?			
	NulliP P	221	117 (53%)
	MultiP PP	181	111 (61%)
	PMP	141	78 (55%)
UI during sexual intercourse normal?			
	NulliP P	221	12 (5%)
	MultiP PP	181	9 (5%)
	PMP	145	19 (13%)
Occasional dyspareunia normal?			
	NulliP P	221	66 (30%)
	MultiP PP	181	52 (29%)
	PMP	146	49 (34%)
Continuous dyspareunia normal?			
	NulliP P	221	4 (2%)
	MultiP PP	180	6 (3%)
	PMP	146	4 (3%)
<b>Knowledge about pelvic floor therapy</b>			
Do you know what PFT means? (no answers)**			
	NulliP P	221	192 (87%)
	MultiP PP	180	123 (68%)
	PMP	135	100 (74%)
Ever received PFT? (yes answers)**			
	NulliP P	221	22 (10%)
	MultiP PP	180	76 (42%)
	PMP	146	35 (24%)
Prenatal physiotherapy useful? (yes answers)			
	NulliP P	221	184 (83%)
	MultiP PP	180	137 (76%)
	PMP	147	124 (84%)

**Table 1.** Continued.

Item/ question	Group	N	
Postnatal physiotherapy useful? (yes answers)			
	NulliP P	221	196 (89%)
	MultiP PP	181	168 (93%)
	PMP	147	134 (91%)
<b>Education and gathering of information about the topic</b>			
Estimation of knowledge (0–10)**			
	NulliP P	220	3.71 (SD 2.59)
	MultiP PP	181	5.21 (SD 2.62)
	PMP	147	4.92 (SD 2.72)
Ever received information? (yes answers)**			
	NulliP P	219	62 (28%)
	MultiP PP	179	133 (74%)
	PMP	141	80 (57%)
Ever searched for information? (yes answers)			
	NulliP P	221	55 (25%)
	MultiP PP	181	51 (28%)
	PMP	128	46 (36%)
Sufficiently informed? (no answers)**			
	NulliP P	221	178 (81%)
	MultiP PP	180	94 (52%)
	PMP	137	77 (56%)
Interested in more information? (yes answers)**			
	NulliP P	221	195 (88%)
	MultiP PP	180	107 (59%)
	PMP	138	94 (68%)

NulliP P: group of nulliparous pregnant women; MultiP PP: group of multiparous pregnant women and postnatal women (until 3 months post delivery); PMP women: postmenopausal women; UK: unknown (answered with “I don’t know”); UI: urinary incontinence; SUI: stress urinary incontinence; PFMs: pelvic floor muscles; PFT: pelvic floor therapy. \*\* The difference between groups for this item is significant (p<0.001)

Worries about PF: The majority (n=89, 57%) of the PMP women expressed a concern about urinary incontinence; this was significantly higher than in the PP group (n=132, 33%). No significant difference was found for fear of fecal incontinence (7 PP women, 12%; 16 PMP women, 10%; p=0.484) or fear of prolaps (26 PP women, 7%; 16 PMP women, 10%; p=0.128).

## DISCUSSION

The results of this extended survey show moderate actual knowledge about PFMs and PFD in PP and PMP women. The questionnaire was not constructed to rate the degree of knowledge. The answers could not always be considered right or wrong. On the contrary, the questions were constructed to reveal better comprehension of the current knowledge and ideas of women about this topic.

To the best of our knowledge, all previous studies have focused on the knowledge of PFMT and not on the general knowledge women have about PFMs and PFD<sup>19, 20</sup>. Mandimika et al. recently investigated the knowledge of UI and POP among a population of community-dwelling woman<sup>10</sup>. Similar to our results, they found a global lack of knowledge about UI and POP among community-dwelling women, with more pronounced knowledge gaps among nonwhite women. Our present study investigated the knowledge of a broad range of all PFD symptoms and compared the results in different phases of life (age groups).

Previously, we observed an important lack of knowledge in young nulliparous women about the PFMs and PFD<sup>13</sup>. Young women who had never been exposed to PFD risk factors such as pregnancy and delivery rated their actual knowledge about these topics as 2.4 ± 2.01/10. The results of the present study reveal slightly better actual knowledge with PP and PMP

women scoring their own knowledge significantly higher ( $4.4 \pm 2.71/10$  for PP women and  $4.9 \pm 2.72/10$  for PMP women). Thus we can conclude that the actual knowledge of women about the PFMs and PFD differ with age, pregnancy, parity, and menopause. But it is certainly remarkable that the level of knowledge did not differ significantly between PP and PMP women for most of the questions and that it still remains poor (less than 5/10).

PP and PMP women showed the same trend in acceptance of PFD symptoms after delivery: most women agree that certain PFD symptoms could be considered normal immediately after childbirth but should improve or disappear after 3 to 6 months. Nevertheless, significant differences were found for these questions between the two groups. More PP women accepted PFD complaints. Their illness perceptions about PFD after childbirth were more pessimistic, and this was in agreement with the results found in nulliparous women. In our opinion, it is important to use education about this topic to prevent young women from accepting PFD symptoms and to empower help-seeking behavior.

A significant difference between groups existed with respect to parity. Parity and gravidity were significantly higher in the PMP group compared with the PP group. But the general knowledge about PFMs and PFD did not differ between these groups. This led us to the conclusion that higher numbers of pregnancies and deliveries do not seem to improve knowledge about the PF.

It is remarkable that only half of the PP and PMP women ever received information about the PF and that a majority of them would welcome more information. When information was provided, it was mostly during pregnancy or around delivery in the PP group; most PMP women got information in the postmenopausal period, which is rather late.

The participating PMP women were significantly better aware of PFD risk factors such as obesity and constipation. Similar results were found for POP: PMP women were better aware of this PFD symptom. Better knowledge of these symptoms and contributing factors, at a younger age, could affect help-seeking behavior<sup>10, 19)</sup> and positively influence prevention of PFD.

Also, PMP women were significantly more occupied with and in fear of PFD. This may be related to the higher prevalence of PFD in their age group. Information and education about complaints, syndromes, and pathologies has been shown to affect cognition and perceptions<sup>20, 21)</sup> of patients about their complaints. Furthermore previous research has also suggested education as a means of avoiding catastrophizing behavior of patients<sup>22)</sup>.

Information about the PF was received rather late in life, so timely prevention was not possible. This shows that there is work to be done to better inform all women. One can only encourage the trend that we observed that more women these days are already getting informed about this topic during their childbearing years. Nevertheless the results of this study confirm the need to reach more women with good information, and the authors suggest information should be offered repeatedly to ensure it is not forgotten. Improved knowledge about such things as bladder behavior, PFM exercises, and stool habits would likely make a great difference. Further work is needed to determine how such education should be provided and who should provide it.

A shortcoming of the present study may be that the participants were young women of Belgian ethnicity with mid to high levels of education. Previous research revealed better knowledge about urologic topics in white women compared with other races<sup>10, 23)</sup>. More research in women with different demographic characteristics could help define how general our findings are.

In 2013, Buurman et al. performed a qualitative research about women's perceptions about PFD and their help-seeking behavior. Several women explicitly mentioned embarrassment as an impediment for seeking help<sup>21)</sup>. In general, PF problems are still a taboo for most women. The low number of women in our study that took active steps to get help or information confirms these statements. Our results clearly reveal that the majority of women of all ages are aware of the problem, feel badly informed, and are interested in more information. This is a strong argument further work on improving and intensifying PF education. Future research must investigate how women would like to be informed and which campaigns would be the most effective, with the best compliance.

To conclude, there is sparse knowledge about the pelvic floor among women of all ages. Most postmenopausal women get informed during the postmenopausal period, which is very late. A major proportion of women would be interested in more information. Improving common knowledge about PFMs and PFD could improve help-seeking behavior in women but could also have a role in the prevention of PFD.

### *Conflict of interest*

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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## REFERENCES

- 1) Bortolini MA, Drutz HP, Lovatsis D, et al.: Vaginal delivery and pelvic floor dysfunction: current evidence and implications for future research. *Int Urogynecol J Pelvic Floor Dysfunct*, 2010, 21: 1025–1030. [Medline] [CrossRef]
- 2) Bump RC, Norton PA: Epidemiology and natural history of pelvic floor dysfunction. *Obstet Gynecol Clin North Am*, 1998, 25: 723–746. [Medline] [CrossRef]
- 3) MacLennan AH, Taylor AW, Wilson DH, et al.: The prevalence of pelvic floor disorders and their relationship to gender, age, parity and mode of delivery. *BJOG*, 2000, 107: 1460–1470. [Medline] [CrossRef]
- 4) Fonti Y, Giordano R, Cacciatore A, et al.: Post partum pelvic floor changes. *J Prenat Med*, 2009, 3: 57–59. [Medline]
- 5) Boyle R, Hay-Smith EJ, Cody JD, et al.: Pelvic floor muscle training for prevention and treatment of urinary and faecal incontinence in antenatal and postnatal women. *Cochrane Database Syst Rev*, 2012, 10: CD007471. [Medline]
- 6) Buckley BS, Lapitan MC, Epidemiology Committee of the Fourth International Consultation on Incontinence, Paris, 2008: Prevalence of urinary incontinence in men, women, and children—current evidence: findings of the Fourth International Consultation on Incontinence. *Urology*, 2010, 76: 265–270. [Medline] [CrossRef]
- 7) Jackson S: Stress urinary incontinence: new management options. *Curr Med Res Opin*, 2005, 21: 1669–1675. [Medline] [CrossRef]
- 8) Botlero R, Urquhart DM, Davis SR, et al.: Prevalence and incidence of urinary incontinence in women: review of the literature and investigation of methodological issues. *Int J Urol*, 2008, 15: 230–234. [Medline] [CrossRef]
- 9) Melville JL, Wagner LE, Fan MY, et al.: Women's perceptions about the etiology of urinary incontinence. *J Womens Health (Larchmt)*, 2008, 17: 1093–1098. [Medline] [CrossRef]
- 10) Mandimika CL, Murk W, Mühlhäuser McPencow A, et al.: Knowledge of pelvic floor disorders in a population of community-dwelling women. *Am J Obstet Gynecol*, 2014, 210: 165.e1–165.e9. [Medline] [CrossRef]
- 11) Kinchen KS, Burgio K, Diokno AC, et al.: Factors associated with women's decisions to seek treatment for urinary incontinence. *J Womens Health (Larchmt)*, 2003, 12: 687–698. [Medline] [CrossRef]
- 12) Shah AD, Massagli MP, Kohli N, et al.: A reliable, valid instrument to assess patient knowledge about urinary incontinence and pelvic organ prolapse. *Int Urogynecol J Pelvic Floor Dysfunct*, 2008, 19: 1283–1289. [Medline] [CrossRef]
- 13) Neels H, Wyndaele JJ, Tjalma WA, et al.: Knowledge of the pelvic floor in nulliparous women. *J Phys Ther Sci*, 2016, 28: 1524–1533. [Medline] [CrossRef]
- 14) Passmore C, Dobbie AE, Parchman M, et al.: Guidelines for constructing a survey. *Fam Med*, 2002, 34: 281–286. [Medline]
- 15) Burns KE, Duffett M, Kho ME, et al. ACCADEMY Group: A guide for the design and conduct of self-administered surveys of clinicians. *CMAJ*, 2008, 179: 245–252. [Medline] [CrossRef]
- 16) Kelley K, Clark B, Brown V, et al.: Good practice in the conduct and reporting of survey research. *Int J Qual Health Care*, 2003, 15: 261–266. [Medline] [CrossRef]
- 17) O' Cathain A, Thomas KJ: "Any other comments?" Open questions on questionnaires—a bane or a bonus to research? *BMC Med Res Methodol*, 2004, 4: 25. [Medline] [CrossRef]
- 18) Collins D: Pretesting survey instruments: an overview of cognitive methods. *Qual Life Res*, 2003, 12: 229–238. [Medline] [CrossRef]
- 19) Whitford HM, Alder B, Jones M: A cross-sectional study of knowledge and practice of pelvic floor exercises during pregnancy and associated symptoms of stress urinary incontinence in North-East Scotland. *Midwifery*, 2007, 23: 204–217. [Medline] [CrossRef]
- 20) Liao YM, Dougherty MC, Liou YS, et al.: Pelvic floor muscle training effect on urinary incontinence knowledge, attitudes, and severity: an experimental study. *Int J Nurs Stud*, 2006, 43: 29–37. [Medline] [CrossRef]
- 21) Buurman MB, Lagro-Janssen AL: Women's perception of postpartum pelvic floor dysfunction and their help-seeking behaviour: a qualitative interview study. *Scand J Caring Sci*, 2013, 27: 406–413. [Medline] [CrossRef]
- 22) Soares AD, Couceiro TC, Lima LC, et al.: Association of pain catastrophizing with the incidence and severity of acute and persistent perineal pain after natural childbirth: longitudinal cohort study. *Braz J Anesthesiol*, 2013, 63: 317–321. [CrossRef]
- 23) Shah AD, Shott S, Kohli N, et al.: Do racial differences in knowledge about urogynecologic issues exist? *Int Urogynecol J Pelvic Floor Dysfunct*, 2008, 19: 1371–1378. [Medline] [CrossRef]

## Appendix 1. Questionnaire

**Remark for researchers and physicians: The survey's translation provided in English is for information only and has not been tested. Literal translation of the original Dutch version may not convey the meanings intended. To obtain the original psychometrically validated questionnaire please contact the authors.**

*Dear Madam,*

*The purpose of this study is to improve the prevention and the treatment of pelvic floor disorders. Through the questionnaire below, we try to explore the current knowledge of women (who have never been pregnant before) about the pelvis and pelvic floor muscles. Therefore we would like you to respond spontaneously to these questions without searching for the correct answers in books or on the Internet.*

*This survey is completely anonymous and was approved by the Ethics Committee(B300201318334). Completion takes about 20 minutes of your time.*

*We thank you for your cooperation.*

Occasionally we will ask you some open answer questions. Please fill in the thoughts that first come into your mind.

- 1) How old are you? ... years
- 2) Mark your highest degree of education:
 

<input type="checkbox"/> Elementary School	<input type="checkbox"/> High School	<input type="checkbox"/> University/ College
--	--------------------------------------	--
- 3) What is your current occupation (profession)?.....
- 4) Nationality: Mark to which group you belong:
 

<input type="checkbox"/> Belgian	<input type="checkbox"/> Moroccan	<input type="checkbox"/> Polish
<input type="checkbox"/> Dutch	<input type="checkbox"/> Turkish	<input type="checkbox"/> Others: ...
- 5) Origin: Indicate your native origin:
 

<input type="checkbox"/> Belgian	<input type="checkbox"/> Moroccan	<input type="checkbox"/> Polish
<input type="checkbox"/> Dutch	<input type="checkbox"/> Turkish	<input type="checkbox"/> Others:....

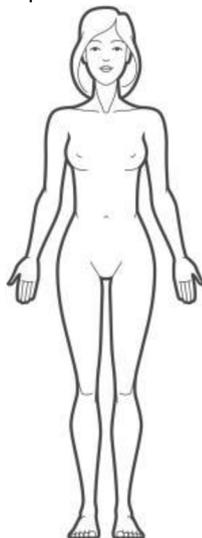
*If you have never been pregnant, proceed to question 11 .*

- 6) Are you currently pregnant?  Yes  No  I don't know  
 If so: How many weeks are you pregnant now? ... weeks
- 7) How many times have you been pregnant? ... times
- 8) How many times did you give birth already? ... times
- 9) In which year did you last give birth? .....
- 10) In which ways did you give birth (type of delivery)? And how many times?
 

▪ Vaginal	Yes / no	... times
• Did they have to cut? (episiotomy)	Yes / no	... times
• Did you tear? (rupture)	Yes / no	... times
▪ Caesarean	Yes / no	... times
▪ Spoons / Forceps	Yes / no	... times
▪ Vacuum extraction	Yes / no	... times
▪ Others: .....		
- 11) Are you currently in transition or in your postmenopausal period?  Yes  No  I don't know
- 12) What is included in the pelvic floor? Multiple answers are possible.
 

<input type="checkbox"/> Muscles	<input type="checkbox"/> Tendons and ligaments	<input type="checkbox"/> Abdominal organs:
<input type="checkbox"/> Skin and fat	<input type="checkbox"/> Arteries and nerves	Uterus, bladder, bowel,
<input type="checkbox"/> Bone and joints	<input type="checkbox"/> Other: .....	kidneys

13) Where can you localize the pelvic floor muscles? Please mark on this graph.



14) What do the pelvic floor muscles do?  I don't know

.....  
.....

Why do we need them?  I don't know

.....  
.....

15) Is a healthy woman able to control (contract and relax) the pelvic floor muscles whenever she wants?  
 Yes  No  I don't know

16) Which movement do the pelvic floor muscles make? Please mark, multiple answers are possible.  
 Pinching movement  Outward pushing movement  
 Inwards lifting movement  No conscious control possible

17) How many openings do women have in the pelvic floor?  I don't know

.....  
Which are they?  I don't know

.....  
.....

18) Which are the possible causes of bad functioning of the pelvic floor muscles? Please mark the three most common causes.

- |  |   |  |
|--|---|--|
| <input type="checkbox"/> Pregnancy               | <input type="checkbox"/> Surgery of to the urinary tract, uterus or abdomen | <input type="checkbox"/> Caesarean delivery                    |
| <input type="checkbox"/> Heredity                | <input type="checkbox"/> Drinking Alcohol                                   | <input type="checkbox"/> Constipation (blockage of the bowels) |
| <input type="checkbox"/> Vaginal delivery        | <input type="checkbox"/> Smoking  | <input type="checkbox"/> Others: ...                           |
| <input type="checkbox"/> Straining during peeing |   |  |
| <input type="checkbox"/> Overweight (obesity)    |   |  |

19) Does a healthy person occasionally loses urine?  
 Yes  No  I don't know

20) Does a healthy person loses urine during exercise or effort, such as intensive sports?  
 Yes  No  I don't know

21) Do you find it normal if women daily use a precautionary pad to control urine leakage?  
 Yes  No  I don't know

22) Are the pelvic floor muscles not as strong as before, after childbirth?  
 Yes  No  I don't know

If yes, mark which consequences after childbirth are normal, multiple answers are possible:

- |  |   |
|--|---|
| <input type="checkbox"/> Gapping vagina                            | <input type="checkbox"/> Pain in the pelvic floor             |
| <input type="checkbox"/> (Involuntary) loss of urine               | <input type="checkbox"/> Pain during intercourse              |
| <input type="checkbox"/> Stool problems (blockage, diarrhea, etc.) | <input type="checkbox"/> Diminished orgasm during intercourse |
| <input type="checkbox"/> Flatulence                                |   |

23) Does a healthy woman experiences pain in the pelvic floor?  
Immediately after delivery  Yes  No  I don't know  
1 month after delivery  Yes  No  I don't know  
6 months after delivery  Yes  No  I don't know

24) Does a healthy woman occasionally loses urine?  
Immediately after delivery  Yes  No  I don't know  
1 month after delivery  Yes  No  I don't know  
6 months after delivery  Yes  No  I don't know

25) Does a healthy woman occasionally loses stool?  
Immediately after delivery  Yes  No  I don't know  
1 month after delivery  Yes  No  I don't know  
6 months after delivery  Yes  No  I don't know

26) Does an average women experiences pain during intercourse?  
1 month after delivery  Yes  No  I don't know  
6 months after delivery  Yes  No  I don't know

27) **Circle per line** which way of delivery may have the most negative consequences for the pelvic floor muscles:

- |  |    |                                      |
|--|----|--------------------------------------|
| • Caesarean Section                      | OR | vaginal delivery                     |
| • Fast vaginal delivery                  | OR | vaginal delivery that takes longer   |
| • Vaginal delivery with episiotomy (cut) | OR | vaginal delivery with rupture (tear) |
| • Vaginal delivery with spoons / forceps | OR | vaginal delivery with vacuum         |

28) What can be cut or tear during vaginal delivery?  I don't know

29) What does the term "prolapse/sagging in the small basin" means for you?  I don't know

What can prolapse/sag/descend in the small basin?  don't know

30) Do pelvic floor muscles play a role in getting a sexual orgasm?  
 Yes  No  I don't know

31) Does a healthy woman frequently experiences pain during sexual intercourse?  
 Yes  No  I don't know

32) Does a healthy woman leaks a little bit urine during sexual intercourse?  
 Yes  No  I don't know

33) Do you think that prenatal physiotherapy (during pregnancy, before delivery) is useful?  
 Yes  No  I don't know

34) Do you think that postnatal physiotherapy (after delivery) is useful?  
 Yes  No  I don't know

35) Do you know the therapy that is given to women with pelvic floor problems? Yes / No

36) Did you ever receive pelvic floor therapy? Yes / No  
If yes, why? .....

37) How much do you know about the pelvic floor muscles on a scale from zero to ten, whereas zero is absolutely nothing and ten is expert in the domain? Mark your knowledge with a cross on the horizontal line.  
0 ----- 10

38) Did you ever receive information about the pelvic floor muscles? Yes / No  
If yes: When? .....

For which reason? .....

From who/what? - multiple answers or possible -

- |  |                                  |   |
|--|----------------------------------|---|
| <input type="checkbox"/> Gynecologist    | <input type="checkbox"/> Nurse   | <input type="checkbox"/> General practitioner |
| <input type="checkbox"/> Friends/family  | <input type="checkbox"/> Midwife | <input type="checkbox"/> Information Evening  |
| <input type="checkbox"/> Physiotherapist | <input type="checkbox"/> School  | <input type="checkbox"/> Others: .....        |

39) Did you ever search for information about this topic on your own initiative? Yes / No

If yes: Through which source? - multiple answers are possible -

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> Books           | <input type="checkbox"/> Internet       | <input type="checkbox"/> Gynecologist         |
| <input type="checkbox"/> Physiotherapist | <input type="checkbox"/> Friends/family | <input type="checkbox"/> General practitioner |
| <input type="checkbox"/> Others: .....   |   |   |

40) Do you find yourself good enough informed about the pelvic floor muscles? Yes / No

41) Do you want more information about the pelvic floor muscles? Yes / No

42) Which is your biggest anxiety or fear about the pelvic floor?  I don't know  None

Thanks for your cooperation!