

## PELVIC FLOOR MUSCLE STRENGTH AND THICKNESS OF THE PELVIC FLOOR MUSCLES IN CONTINENT AND INCONTINENT NULLIPAROUS WOMEN

### Aims of Study

The primary aim of this study was to compare pelvic floor muscle strength and pelvic floor muscle thickness in continent and incontinent nulliparous women. The secondary aim was to study the relation between the measurements of pelvic floor muscle strength and thickness.

### Methods

One hundred and three nulliparous women attending the routine ultrasound scan at 18 weeks of pregnancy were recruited to the study. Background variables and continence status were registered in a structured interview. Women reporting urinary incontinence once per week or more during the last month were categorised as incontinent. All women were instructed in pelvic floor anatomy and how to contract the pelvic floor muscles correctly. Correct contraction was assessed by vaginal palpation and perineal ultrasound. Pelvic floor muscle strength and muscle thickness was measured. During strength measurement the women were in a supine position with straight legs. Pelvic floor muscle strength during maximal pelvic floor muscle contraction was measured using a vaginal balloon catheter (balloon size 6.7x1.7 cm) connected to a pressure transducer (Camtech Ltd, 1300 Sandvika, Norway). The middle of the balloon was positioned 3.5 cm inside the introitus. Only contractions with observed inward movement of the balloon catheter were accepted. Perineal ultrasound was used to measure the thickness of the pelvic floor muscles (Vingmed CFM 800 with a 7.5-MHz vaginal probe). The women were examined in a supine position with 45° hip flexion and slight abduction. With the transducer placed in a sagittal direction on the perineum, just lateral to the vaginal introitus, the pubic bone and the pelvic floor muscles were identified. The women were asked to relax the pelvic floor muscles and then to perform a maximal pelvic floor muscle contraction. The muscle movement during contraction was visualised dynamically. Muscle thickness was measured both during relaxation and contraction, and increment in pelvic floor muscle thickness during contraction was calculated. All measurements were performed as triple-measurements. For each woman values were given as mean of the triple-measurements. As several variables were not normally distributed, correlation was tested by Spearman's rank correlation ( $r_s$ ) and the Mann-Whitney two sample test was used to test differences between groups of continent and incontinent women. P values < 0.05 were considered significant.

### Results

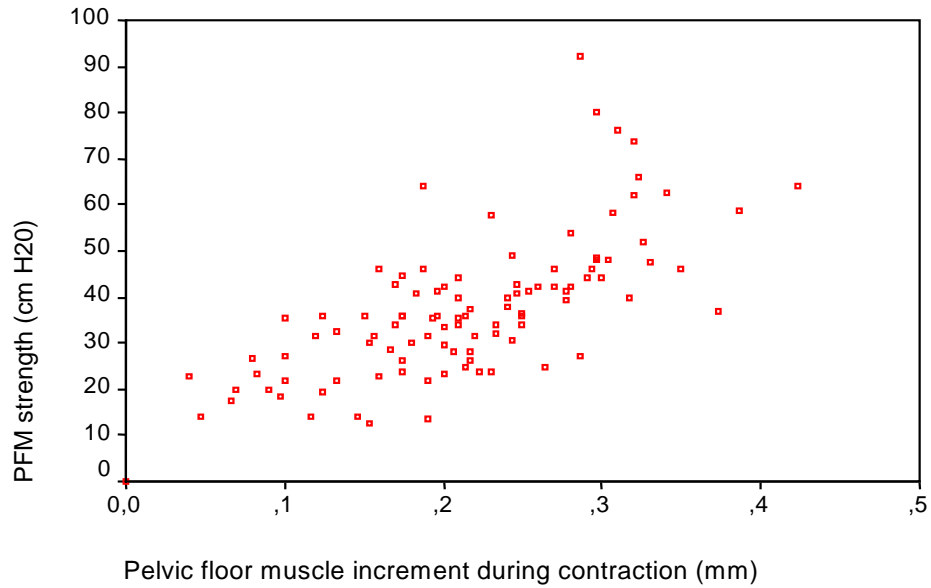
Seventy-one women were categorised as continent and 32 women as incontinent. There was a statistically significant ( $p=0.02$ ) difference in median maximal pelvic floor muscle strength between continent [38 cm H<sub>2</sub>O (35.8-43.49)] and incontinent [31.4 cm H<sub>2</sub>O (27.7-36.3)] women. Similar differences between groups were found according to pelvic floor muscle thickness measured by perineal ultrasound (table 1). Correlation ( $r_s = 0.722$ ) between measurements of maximal pelvic floor muscle strength and perineal ultrasound measurements of change in muscle thickness from relaxation to contraction, is shown in figure 1.

**Table 1.** Pelvic floor muscle (PFM) thickness measured by perineal ultrasound.

Median and 95% Confidence Interval. \*) Mann-Whitney Test

PFM thickness	Continent (n=71)	Incontinent (n=32)	p-value <sup>*)</sup>
Relaxation	0.77 cm (0.68-0.75)	0.60 cm (0.58-0.69)	0.01
Contraction	0.99 cm (0.90-0.98)	0.83 cm (0.75-0.90)	<0.01
Increment	0.22 cm (0.21-0.25)	0.19 cm (0.16-0.21)	0.01

**Figure 1.** Correlation of pelvic floor muscle strength and thickness



**Conclusions**

We found statistically significant differences between continent and incontinent nulliparous women at 18 weeks of pregnancy, both in measurements of pelvic floor muscle strength and pelvic floor muscle thickness. There was a statistically significant correlation between pelvic floor muscle strength measured by vaginal squeeze pressure and perineal ultrasound measurements of pelvic floor muscle thickness.