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Asai Y[1], Hotta K[1], Yoshida M[2], Matsuzaki M[1], Sasagawa E[1], Haruna M[1]
1. *Department of Midwifery and Women's Health, Division of Health Scienses and Nursing, Graduate School of Medicine, the University of Tokyo,Tokyo,Japan,* ***2.*** *Department of Life Support Technology(Molten), Graduate School of Medicine, the University of Tokyo,Tokyo,Japan*

THE DIFFERENCES OF MORPHOLOGICAL CHANGES IN THE LEVATOR ANI MUSCLE IN POSTPARTUM WOMEN WHO LEARNED PELVIC FLOOR MUSCLE (PFM) CONTRACTIONS GROUP AND THOSE WHO UNLEARNED PFM CONTRACTIONS GROUP DURING PFM TRAINING PROGRAM: A LONGITUDINAL STUDY ON THE INTERVENTION.

Hypothesis / aims of study
To identify the differences in morphological changes in the levator ani muscle in postpartum women in the learned pelvic floor muscle contractions (PFMC) group and those in the unlearned PFMC group during the pelvic floor muscle training period.

Study design, materials and methods
This longitudinal study on the intervention, conducted at a maternity home in Japan from December 2014 to December 2015, included 27 primiparous women at 2 months after vaginal delivery. The exclusion criteria were as follows: a history of cesarean section, multiple births, or breech delivery; presence of incontinence before pregnancy; presence of neuropathic urinary and fecal incontinence; restricted physical activity; and age <20 years. The participants underwent weekly pelvic floor muscle training sessions for 3 months, starting 3 months after delivery, and also practiced at home. When the women performed PFMC correctly, displacement of the bladder base in the cranioventral direction could be seen on two-dimensional transabdominal ultrasonography (Nemio17; Toshiba Medical Systems Corp., Tokyo, Japan; 3.5–5-MHz curved array ultrasound transducer). The number of correct PFMCs out of the 10 repetitions in each session was calculated. The women who correctly performed 9 of 10 contractions during the sessions and those who were unable to perform correct contractions of their pelvic floor muscles were classified into the learned and unlearned PFMC groups, respectively. The outcome measure was morphological changes in the levator hiatus, assessed by three/four-dimensional transperineal ultrasonography (Voluson i; GE Healthcare, Zipf, Austria; 1.5–5.3MHz curved array transducer, RAB2-5-RS) form baseline (2 months after delivery) to end of pelvic floor muscle training (5–6 months after delivery). Between the two groups, the changes of the anterior-posterior diameter, left-right diameter, and area of the levator hiatus at rest, during PFMC, and during the Valsalva maneuver were compared. The symptoms of pelvic floor disorders and quality of life regarding pelvic floor disorders were evaluated at baseline and 5–6 months postpartum by using the three scales; International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF) and the Pelvic Floor Distress Inventory-Short Form 20 (PFDI-20), and Incontinence Quality of Life Questionnaire (I-QOL). In addition, information on maternal age, educational level, height, weight, gestational weight gain, mode of delivery, total time of labor, and the infant status at birth and 1 month after delivery was obtained from the maternal and child health book and the original questionnaire at baseline. The researcher also measured self-efficacy regarding PFMT by using the pelvic floor muscle exercise self-efficacy scale at the first, sixth, and final sessions. The Student t test for parametric continuous variables, the Mann-Whitney U test for non-parametric continuous variables, and the chi-square test or Fisher exact test for categorical variables were performed to compare the differences between the two groups. The power calculation was based on power estimation and the results of a previous study (1), with an effect size of 0.60–0.77 and statistical power of 80%, at a 5% significance level. Levator hiatus assessments required at least 30 women in each group.

Results
Thirty-two postpartum women completed the PFMC training program. After the program, 27 women (84.4%) were classified into two groups after excluding 5 women (15.6%) who correctly contracted their pelvic floor muscles in the first session. The mean (SD) age of these 27 postpartum women was 31.0 (4.5) years. The learned group included 17 women (62.9%); and the unlearned group, 10 women (37.1%; Figure1).

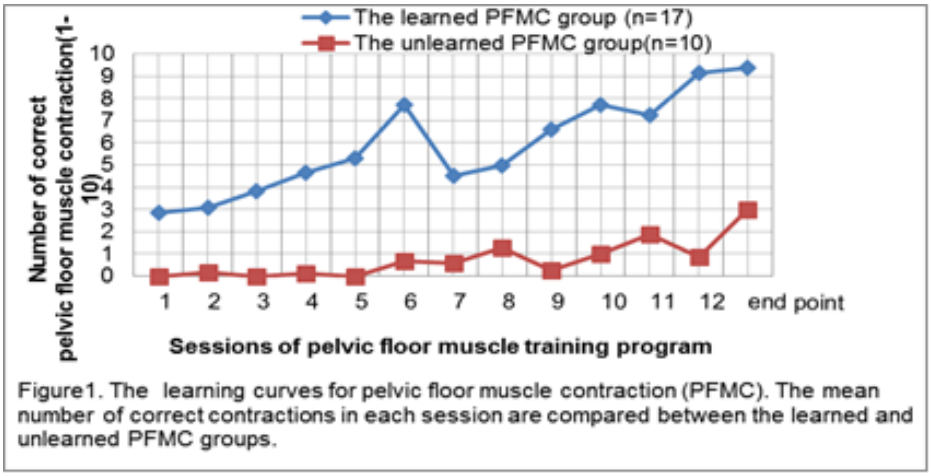

Figure1. The learning curves for pelvic floor muscle contraction (PFMC). The mean number of correct contractions in each session are compared between the learned and unlearned PFMC groups.

The two groups had no demographic differences. Infant body weight at 1 month after birth was significantly lower in the learned PFMC group than in the unlearned PFMC group (3825 ± 365 g vs. 4385 ± 544 g, p = 0.004). The self-efficacy in the pelvic floor

muscle training in the final, 12th session was higher in the women in the learned PFMC group than in those in the unlearned group (79.7 ± 13.61 vs. 59.8 ± 8.59, p = 0.001).
No differences in the morphology of the levator hiatus at baseline were observed between the two groups, excluding the fractional shortening of the left-right diameter at baseline, which was significantly greater in the learned PFMC group than in the unlearned PFMC group (2.2% ± 5.6% vs. 8.3% ± 8.0%, p = 0.031). The changes in the left-right diameter and area of the levator hiatus at rest (left-right diameter: −3.2 ± 1.4 mm vs. +1.7 ± 4.0 mm, p = 0.011; area: −133.9 ± 208.20 mm^2 vs. +79.2 ± 309.1 mm^2, p = 0.040), and the change in the area during PFMC (−166.0 ± 241.1 mm^2 vs. +14.60 ± 192.6 mm^2, p = 0.045) were significantly reduced in the women in the learned PFMC group as compared with those in the women in the unlearned PFMC group. In addition, the fractional shortening of the anteroposterior diameter of the levator hiatus at end of the pelvic floor muscle trainng period in the learned PFMC group was greater than that in the unlearned PFMC group (15.1% ± 6.9% vs. 8.8% ± 8.3%, p = 0.027). Other morphological parameters of the levator hiatus did not significantly differ between the two groups.

Interpretation of results

Statistical significant difference in infant weight of the one month after birth, thus the load on the pelvic floor might be increased intra-abdominal pressure due to infant weight gain. A previous study (2) has shown that increased intra-abdominal pressure confers the risk of pelvic floor disorders. However, a slight rise for 1 month to the pelvic floor after applying a load might not have affected the learning of PFMC. In addition, fractional shortening of the left-right diameter of the levator hiatus was higher at baseline in the learned PFMC group. This suggests the possibility that the contractile function of the learned PFMC group was higher before the start of the PFMC training. The self-efficacy of pelvic floor muscle training at the last 12th session was significantly lower among women in the unlearned PFMC group. The lack of awareness of PFMC among the women in the unlearned PFMC group might have caused the lower self-efficacy in the last session. The demographic characteristics, pregnancy- and delivery-related factors, infant status, pelvic floor disorder symptoms, and quality of life with respect to pelvic floor disorders were similar between the two groups.
Changes in the morphology of the levator hiatus, its left-right diameter at rest, and its area at rest and during PFMC were more significantly reduced in the learned PFMC group than in the unlearned PFMC group. Correct PFMC may induce morphological changes in the levator ani muscle, as evidenced by the significant decrease in the change in the left-right diameter and area in the women in the learned PFMC group. In addition, correct contraction might have also resulted in improved contractile function in the learned PFMC group, and the fractional shortening in the anteroposterior diameter was greater in the learned PFMC group.

Concluding message

Learning correctly PFMC in the pelvic floor muscle training program was effective in inducing morphological changes in the levator ani muscle in postpartum women. This is in accordance with the exemplary program in clinical, suggesting the need for care to facilitate learning the correct contraction. It is important to determine the reason why some women could not learn correctly contracting the pelvic floor muscle. In this direction, we will conduct a further study with a larger sample size.

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Disclosures

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