

## Can antenatal pelvic floor muscle training prevent urinary incontinence?

Orawan Lekskulchai, Preecha Wanichsethakul

### Abstract

**Objectives:** To assess the efficacy of antenatal pelvic floor muscle training (PFMT) for preventing urinary incontinence.

**Methods:** 219 nulliparous women in first trimester, who visited the antenatal care clinic at Thammasat University Hospital, were recruited. They were asked to answer the Thai version of King's health questionnaires and were randomly divided into two groups. One hundred and eleven women were allocated to non-PFMT group and 108 to PFMT group. The outcome was the prevalence of moderately to severe urinary incontinence in first trimester, 30-38 weeks gestation and 6 months postpartum.

**Results:** Frequency and nocturia were the first and second most frequent of bladder problems, respectively. Only 1.4% in non-PMFT group and 1.8% in PMFT group had urge incontinence. No woman in PMFT group had stress incontinence in first trimester. During 30-38 weeks, the women in PMFT group reported moderate to severe stress incontinence less than the women in non-PMFT group with statistical significance ( $P = 0.03$ ). At 6 months postpartum, the women in non-PMFT group reported that frequency, nocturia, urge incontinence and stress incontinence affected their life more frequent than the PMFT group but without significance. When compare the mean rank of rating score between the first trimester and 6 months postpartum, the PMFT group reported lower mean rank of urge incontinence than the non-PMFT group, with statistical significance.

**Discussion:** The prevalence of urge incontinence and stress incontinence which had moderately to severely affected the quality of life in first trimester pregnancy was 3.2% and 1.4%, respectively. The antenatal PFMT seems to have the preventive effect on stress urinary incontinence at 30-38 weeks pregnancy ( $P = 0.03$ ) but not in the 6 months postpartum ( $P = 0.82$ ).

**Key words:** Pregnancy, Urinary incontinence, pelvic floor muscle

## Introduction

Many epidemiological studies have shown that urinary incontinence (UI) is common during and after the first pregnancy. The prevalence of UI during pregnancy varies between 3-67%.<sup>1-3</sup> Both prevalence and severity of UI seem to increase throughout pregnancy. It also compromised daily life of pregnant women.<sup>4</sup> Both anatomical change and hormonal change during pregnancy can disrupt the normal pelvic floor function.<sup>5</sup>

As early as 1948, Kegel<sup>6</sup> advocated pelvic floor muscle training (PFMT) in treatment and prevention of UI in women. His concept had been supported by the recent studies which shown that PFMT during pregnancy can prevent UI both during and in the immediate postpartum.<sup>7-9</sup> And most of the western women have been encouraged to conduct pelvic floor muscle exercise during pregnancy and after childbirth. But this knowledge has not been popularly known in Thai women and there is no study about this effect of PFMT in Thai pregnancy. So the aim of this study is to study the effect of pelvic floor muscle training during pregnancy on prevention of UI in Thai women.

## Methods

From February 2008 to June 2010, 219 nulliparous pregnant women were recruited after receiving the information about the study and signing the informed consent. Inclusion criteria were nulliparous, singleton pregnant women in first trimester without any medical complications. All women had answered the Thai-version of King's health questionnaires by themselves. This questionnaire contains the series of questions related to bladder problem that affected the daily life of the patients. Each question has 4 rating scores for the different severity of the affected problem. After completing the questionnaire, ultrasonography was done to confirm the gestational age and singleton pregnancy. Body weight and height were recorded.

The recruited first trimester pregnant women were randomly allocated into 2 groups by blindly picking up a piece of paper which has number of 1 or 2 from a closed-box, 111 women who got paper of number 1 were allocated into non-PFMT group and other 108 women getting paper of number 2 into non-PFMT group. The women in non-PFMT group followed the routine antenatal care, but the women in PFMT group were individually instructed in pelvic floor anatomy and how to contract the pelvic floor muscle. Correct contraction was assessed by ultrasound-aided visual feedback. The exercise course included 15 series of 5 second hold contraction-relaxation. The women in PFMT group had to do at least three courses of the exercise after meal. During the first and second visits, the assistant staff made a phone call once a week to stimulate and motivate the women in PFMT group to do the exercise regularly. The second visit was conducted at 30-38 weeks gestation. There were 100 women in non-PFMT group and 104 women in PFMT group who could follow up the study. They were asked to complete the questionnaire for the second time. The last visit was conducted in 6 months postpartum period. 39 women were dropped out at this visit remaining 65 women in non-PFMT group and 81 women in PFMT group.

The general characteristics of the women were analyzed by using independent t-test. The comparison between 2 groups for each question was analyzed by using Mann-Whitney U test, and the comparison between the different periods in the same PFMT group was analyzed by using Wilcoxon Signed Ranks Test. P values less than 0.05 were considered significant.

## Results

The general characteristics between PFMT and non-PFMT group were not different. The mean age of the women in non-PFMT group was 26.5

$\pm 5.4$  years and in the PFMT group was  $27.0 \pm 3.9$  years ( $P=0.5$ ). The average BMI of the women in PFMT group was  $21.6 \pm 3.7$  kg/m<sup>2</sup> and  $21.1 \pm 3.5$  kg/m<sup>2</sup> for the women in non-PFMT group ( $p = 0.3$ ).

Of 219 women, the baseline prevalence of urinary frequency and nocturia was 84.6% and 77.2%, respectively. In addition, the baseline prevalence of urge incontinence and stress incontinence was 14.9% and 11.4%, respectively. There were 111 women randomly allocated to non-PFMT group and 108 women to PFMT group. Table 1 shows the percentage of the rating score for each bladder symptom reported by the first trimester pregnancies in both groups. During the study, we had to exclude 3 women in non-PFMT group and 2 from the PFMT group due to spontaneous abortion.

At the 30-38 weeks gestation, 10 women dropped out of the study. Of these 10 women, 6 were excluded from the study due to medical complication (2 from pregnancy induced hypertension, 1 from

GDM with insulin usage 1 from placenta previa, 1 from breech presentation and 1 from preterm PROM) and 4 due to moving to other provinces and not convenient to follow up. This remained 100 women in non-PFMT group and 104 women in PFMT group. 48% of the women in non-PFMT group and 51% of the women in PFMT group had urinary frequency. Half of the women in both groups had nocturia. 7.3% in non-PFMT and 5.9% in PFMT group had urge incontinence. Stress incontinence was reported in 5.9% of the women in PFMT and 10.8% in non-PFMT group. When compare the mean rank of the rating score between 2 groups, the mean rank of stress incontinence in PFMT group was statistically significant lower than the mean rank of stress incontinence in non-PFMT group ( $P=0.03$ ). And the mean rank of urge incontinence in PFMT group was also lower than that of the non-PFMT group but without statistical significance ( $P=0.16$ ) (Table 2).

**Table 1** The Percentage of the first trimester pregnancy according to the self-reported rating score for the KHQ

Percent of the first trimester-pregnancy according to rating score							
Questions	Non-PFMT group			PMFT group			Total
	0	1	2+3	0	1	2+3	
How much do you think your bladder affects your life?	42.9	5.9	1.8	43.8	2.7	2.7	100.0
FREQUENCY; going to the toilet very often	5.9	14.2	30.6	9.6	14.2	25.6	100.0
NOCTURIA; getting up at night to pass urine	9.6	17.4	23.7	13.2	19.2	16.9	100.0
URGENCY; a strong and difficult to control desire to pass urine	43.4	3.2	4.1	39.3	6.8	3.2	100.0
URGE INCONTINENCE; urinary leakage associated with a strong desire to pass urine	42.9	6.4	1.4	42.0	5.5	1.8	100.0
STRESS INCONTINENCE; urinary leakage with physical activity e.g. coughing, sneezing, running	44.3	5.0	1.4	44.3	5.0	0.0	100.0
NOCTURNAL ENURESIS; wetting the bed at night	48.9	1.8	0.0	47.0	2.3	0.0	100.0
INTERCOURSE INCONTINENCE; urinary leakage with sexual intercourse	47.9	2.7	0.0	46.1	2.3	0.9	100.0
FREQUENT WATERWORKS INFECTIONS;	47.0	2.7	0.9	46.6	1.8	0.9	100.0
BLADDER PAIN	42.5	6.4	1.8	41.1	5.0	3.2	100.0
Difficulty PASSING URINE	45.7	4.6	0.5	45.2	2.3	1.8	100.0
OTHER SPECIFY	49.3	0.5	0.9	48.9	0.5	0.0	100.0

**Table 2** Mean rank of bladder symptom score at 30-38 weeks pregnancy from Thai-version KHQ

Bladder symptoms	Pelvic floor muscle training		P-value
	Non-PFMT group	PFMT group	
Urinary frequency	78.52	67.25	0.07
Nocturia	75.43	71.10	0.49
Urge incontinence	76.96	70.72	0.16
Stress Incontinence	78.98	69.10	0.03

Mann-Whitney U test,  $P < 0.05$

At 6 months postpartum, there were 146 women remained. There were 65 women in non-PFMT group and 81 women in PFMT group. Most of the dropped out women had to look after their child or moved to other provinces, so they could not come for the last follow up. Of 146 women, 41.4% in non-PFMT group and 53.9% in PFMT group had urinary frequency. None of the women in PFMT group and only 1.4% of the non-PFMT group had urge incontinence. 1.4% of the women in both group had stress incontinence. The mean ranks of the rating score for urge incontinence and stress incontinence

in PFMT group were lower than in the non-PFMT group but without statistical significance ( $p = 0.11$  and  $0.82$  respectively) (Table 3).

Table 4 shows the mean ranks of the rating score for bladder symptoms compared between the different periods in PFMT group. The risk of urge incontinence seems to decrease among women in the training group at 6 months postpartum ( $P < 0.05$ ). The mean rank of stress incontinence at 30-38 weeks gestation and 6 months postpartum decreased from first trimester but without statistical significance ( $p = 0.41$  and  $0.06$  respectively).

**Table 3** Mean rank of bladder symptom score at 6 months after delivery from Thai-version KHQ

Bladder symptoms	Pelvic floor muscle training		P-value
	Non-PFMT group	PFMT group	
Urinary frequency	72.37	74.41	0.65
Nocturia	71.65	74.98	0.44
Urge incontinence	74.75	72.50	0.11
Stress Incontinence	73.75	73.30	0.82

Mann-Whitney U test,  $P < 0.05$

**Table 4** Mean rank of the different bladder symptoms in PFMT group during different periods.

Bladder symptoms	Mean Rank			p-value	
	4-12 weeks	30-38 weeks	6 mo PP		
	(A)	(B)	(C)	A vs B	A vs C
Urinary frequency	30.38	14.00	28.50	0.00	0.06
Nocturia	33.72	16.50	23.50	0.00	0.79
Urge incontinence	10.14	8.50	6.50	0.22	0.00
Stress incontinence	7.00	4.50	4.00	0.41	0.06

Wilcoxon Signed Ranks Test,  $P < 0.05$

### Discussion

From normal physiologic and anatomical changes during pregnancy, most of the pregnant women complain that urinary frequency and nocturia affected their daily life. These problems increase along the pregnant period because of the pressure from growing uterus on bladder. So the prevalence of urinary frequency and nocturia throughout pregnancy were more than 50% and decrease after delivery.

Landon CR, et al. demonstrated that the collagen structure changes and the connective tensile strength decreased during pregnancy.<sup>10</sup> This can cause pelvic floor dysfunction and leads to urinary incontinence during pregnancy. Many studies show high prevalence of urinary incontinence between 20-67% during pregnancy.<sup>2,3,11</sup> We found 26.3% of the women in first trimester had urinary incontinence. The prevalence of urge incontinence was 14.9% and 11.4% for stress incontinence.

Different studies have reported both prevalence and severity of UI seem to increase throughout pregnancy.<sup>12,13</sup> But in our study, we could not confirm this finding. Most of Thai pregnant women did not complain urge incontinence and stress incontinence in 30-38 weeks pregnancy and 6 months postpartum.

We found the relationship between pelvic floor muscle training and stress urinary incontinence

at 30-38 weeks pregnancy, but there was no such relationship at 6 months postpartum. This may be due to the high drop out rate in postpartum period. Therefore, it is difficult to demonstrate the benefit of PFMT. Because these women may be non-compliant and do not recognize the benefit of PFMT after delivery, so they may ignore to continuously exercise their pelvic floor muscle. However, women should be encouraged to perform the PFMT during pregnancy and after childbirth. This study is the first study about the effect of PFMT in Thai pregnant women. Obstetricians should take more attention to encourage and motivate pregnant women to do PFMT regularly.

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## บทคัดย่อ

## การฝึกบริหารกล้ามเนื้อกะบังลมก่อนคลอดสามารถป้องกันการเกิดภาวะปัสสาวะเล็ดหรือไม่

อรวรรณ เล็กสกุลไชย, ปรีชา วาณิชยเศรษฐกุล

โครงการจัดตั้งภาควิชาสูติศาสตร์-นรีเวชวิทยา คณะแพทยศาสตร์ มหาวิทยาลัยธรรมศาสตร์

- วัตถุประสงค์:** เพื่อประเมินประสิทธิภาพของการฝึกบริหารกล้ามเนื้อกะบังลมก่อนคลอดในการป้องกันภาวะปัสสาวะเล็ด
- วิธีการ:** สตรีมีครรภ์ที่ไม่เคยคลอดบุตรมาก่อนจำนวน ๒๑๕ คน ที่มาฝากครรภ์ที่หน่วยตรวจผู้ป่วยนอกสูติ-นรีเวชกรรม โรงพยาบาลธรรมศาสตร์อาสาเข้าร่วมโครงการ และตอบแบบสอบถาม King's health ฉบับภาษาไทย สตรีจำนวน ๑๑๑ คน ถูกจัดเข้ากลุ่มที่ไม่ได้รับการฝึก และอีก ๑๐๔ คน เข้ากลุ่มที่ได้รับการฝึก ผลที่ต้องการวัดคือ ความชุกของการเกิดภาวะปัสสาวะเล็ดที่มีความรุนแรงปานกลางถึงมากในช่วงไตรมาสแรก อายุครรภ์ ๓๐-๓๘ สัปดาห์และ ๖ เดือนหลังคลอด
- ผลการวิจัย:** อาการปัสสาวะบ่อยและปัสสาวะในเวลากลางคืนเป็นอาการที่พบบ่อยที่สุดสองอันดับแรก มีสตรีเพียงร้อยละ ๑.๔ ในกลุ่มที่ไม่ได้รับการฝึกและร้อยละ ๑.๘ ในกลุ่มที่ได้รับการฝึกมีอาการปัสสาวะกลั้นไม่อยู่ ในช่วงไตรมาสแรก ไม่มีสตรีในกลุ่มที่ได้รับการฝึกมีภาวะปัสสาวะเล็ดขณะไอจาม ในช่วงอายุครรภ์ ๓๐-๓๘ สัปดาห์มีสตรีในกลุ่มที่ได้รับการฝึกรายงานว่ามีการไอจามปัสสาวะเล็ดระดับปานกลางถึงมาก เป็นจำนวนน้อยกว่าสตรีในกลุ่มที่ไม่ได้รับการฝึกอย่างมีนัยสำคัญทางสถิติ (ค่า  $P = 0.03$ ) ในช่วง ๖ เดือนหลังคลอดสตรีในกลุ่มที่ไม่ได้รับการฝึกรายงานว่ามีการไอจามปัสสาวะเล็ดระดับปานกลางถึงมาก เป็นจำนวนน้อยกว่าสตรีในกลุ่มที่ได้รับการฝึกอย่างมีนัยสำคัญทางสถิติ เมื่อเปรียบเทียบค่ากลางของระดับคะแนนระหว่างไตรมาสแรก และช่วง ๖ เดือนหลังคลอดพบว่าสตรีในกลุ่มที่ได้รับการฝึกมีค่ากลางของระดับคะแนนสำหรับอาการปัสสาวะกลั้นไม่อยู่น้อยกว่าค่ากลางของสตรีในกลุ่มที่ไม่ได้รับการฝึกอย่างมีนัยสำคัญทางสถิติ
- วิเคราะห์ผล:** ความชุกของภาวะปัสสาวะกลั้นไม่อยู่ และภาวะไอจามปัสสาวะเล็ดที่มีผลต่อคุณภาพชีวิตระดับปานกลางถึงรุนแรงในช่วงไตรมาสแรกเท่ากับร้อยละ ๓.๒ และร้อยละ ๑.๔ ตามลำดับ การฝึกบริหารกล้ามเนื้อกะบังลมก่อนคลอดน่าจะมีผลในการป้องกันภาวะไอจามปัสสาวะเล็ดในช่วงอายุครรภ์ ๓๐-๓๘ สัปดาห์ (ค่า  $P = 0.03$ ) แต่ไม่พบผลนี้ในช่วง ๖ เดือน หลังคลอด (ค่า  $P = 0.52$ )

**คำสำคัญ:** การตั้งครรภ์, กล้ามเนื้อกะบังลม, ภาวะปัสสาวะเล็ด