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Pelvic floor muscle training effect on urinary incontinence knowledge, attitudes, and severity: An experimental study

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Abstract

This study of Taiwanese women investigated effects of pelvic floor muscle training (PFMT) on urinary incontinence (UI) severity and on participants' knowledge and attitudes regarding UI and PFMT. Of 114 participants in a 4-h PFMT program, 55 suffering from UI completed 2 questionnaires, 1 before and 1 after the program. Among them, 78% reported experiencing UI under increased abdominal pressure, and 82% had suffered the condition for more than 1 year. Participants achieved reductions in UI severity after PFMT; and the program produced a significant difference in their knowledge about, though not in their attitudes toward, both UI and PFMT.
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Keywords: Pelvic floor muscle training; Urinary incontinence; Urinary incontinence severity

1. Introduction

Urinary incontinence (UI) is a condition marked by the involuntary loss of urine. It is a worldwide problem, affecting approximately 25 million adults in the United States. Women are affected more often than men; female to male ratios are approximately 4:1 below age 60 and 2:1 for individuals 60 years of age and over (Thom and Brown, 1998). UI, although not a life-threatening disorder, is a condition that poses considerable human and social complication, bringing physical discomfort, economic burden, shame, and loss of self-confidence, all diminishing the quality of life (QOL) of those who suffer it (Kelleher, 2001; Wagner and Hu, 1998). Appropriate management can reduce the suffering that attends UI. Many studies have reported that conservative treatments (therapies that do not involve pharmacological or surgical intervention) can be helpful in managing the condition (Wilson et al., 2002). However, most women accept UI as an ailment connected with childbearing and age, and believe the symptoms should not be considered serious (Hagglund et al., 2003; Reymert and Hunskaar, 1994). Only one-third of women with UI seek medical help (Kirkland et al., 2001). Thus, developing an accessible program for delivering the conservative treatments is essential.

Concerns about UI among women are currently rising within the medical establishment in Taiwan. Few studies have investigated the effects of conservative treatments. In Taiwan, help seeking behavior is less common than in the West—only one-fifth to one-fourth of women with UI seek medical treatment (Chen et al., 2003; Lin and

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Dougherty, 2003). Instead of allowing women to wait at clinics for medical care, health care personnel can and should offer the community appropriate and accessible treatments that sufferers will be more likely to use. In keeping with the understanding that conservative treatments should constitute the first-line response for women with stress and urge UI (Wilson et al., 2002), the aim of this study is to propose an accessible PFMT program in Taiwan for community women with UI and to investigate the effects of this program on UI severity and on women's knowledge and attitudes.

1.1. Conceptual framework and operational definitions

The conceptual framework of this study is demonstrated in Fig. 1. The operational definitions of the specific terms in the conceptual framework are listed below. The assumption of this conceptual framework is that UI severity, and women's knowledge and attitudes related to UI and PFMT, will improve after a PFMT program.

1.1.1. Urinary incontinence (UI)

Involuntary loss of urine during the past 12 months.

1.1.2. Pelvic floor muscle training (PFMT) program

PFMT is a learned technique for strengthening pelvic floor muscles. In this study, the content of the PFMT program includes (a) anatomy and physiology of the urinary system, (b) risk factors of UI, (c) treatment options and management strategies for UI, (d) rationale of PFMT, and (e) technique and effect of PFMT.

1.1.3. UI severity

Measured by (a) Sandvik's UI severity index computed by multiplying women's self-reported frequency of UI by the self-reported amount of urine leakage, and (b) women's self-perceived UI severity.

1.1.4. Knowledge related to UI and PFMT

Women's understanding of the risk factors, treatment options, and management strategies for UI, and their understanding of the rationales, technique, and effects of PFMT.

1.1.5. Attitude toward UI and PFMT

Women's perspectives on UI and PFMT.

1.1.6. Changed UI severity, knowledge related to UI and PFMT, and attitude toward UI and PFMT

The observed change of UI severity, knowledge related to UI and PFMT, and attitude toward UI and PFMT after a PFMT program.

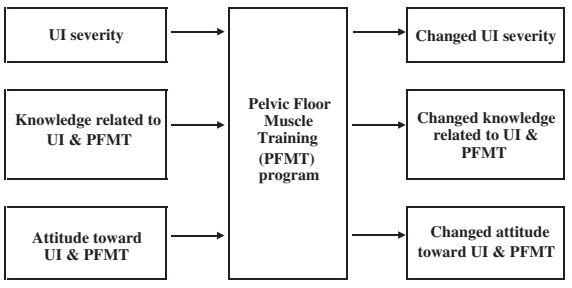

Fig. 1. Conceptual framework for investigating the effects of a PFMT program among community women with UI.

1.2. Research aims

The aims of this study were to investigate the effects of a PFMT program among community women with UI on (a) UI severity, and (b) women's knowledge and attitudes related to UI and PFMT.

2. Literature review

2.1. Conservative treatments

Conservative treatments include lifestyle intervention, bladder training, and physical therapies. Several studies have been conducted to investigate the associations between lifestyle factors (e.g., caffeine consumption and smoking) and UI. Only a few studies have reported the effect of lifestyle intervention (Tomlinson et al., 1999). Bladder training is effective for women with stress, urge, and mixed UI (Wilson et al., 2002), but it can be more complicated to carry out in the community than physical therapies. Physical therapies include PFMT, vaginal cones and biofeedback training, and electrical stimulation (Wilson et al., 2002). The following discussion focuses on the rationale for physical therapies because in this study one such therapy (PFMT) was the intervention.

PFMT and other physical therapies are used for strengthening the pelvic floor muscles. PFMT is a learned technique to increase urethral resistance by increasing periurethral muscle tension, a benefit gained from repeated contractions and relaxations. Increases of intra-abdominal pressure are thus transmitted more equally to the bladder and urethra because pelvic floor muscles are strengthened and the proximal urethra is stabilized by repetitive voluntary contractions of the pelvic floor muscles (Bo, 2004). Vaginal cones and biofeedback training can be used to assist PFMT. Electrical stimulation induces contraction of the muscles around the vagina and urethra and improves the function of the pelvic floor muscles for women with stress UI. For women with urge UI, electrical stimulation of the pudendal nerve causes bladder relaxation and inhibits detrusor overactivity (Wilson et al., 2002).

2.2. PFMT

In 1998, Berghmans and colleagues reviewed 24 randomized clinical trials to assess the efficacy of physical therapy on stress UI in women and found that the efficacy of PFMT in reducing the symptoms of stress UI is supported by strong evidence; that the efficacy of a high-intensity versus a low-intensity regimen of PFMT is supported by limited evidence; and that no evidence is found to support the idea that PFMT with biofeedback is more effective than PFMT alone (Berghmans et al., 1998). PFMT combined with bladder training is recommended for patients with urge UI because it can reduce urgency and in fact help prevent urge UI (Wilson et al., 2002). The efficacy of PFMT in reducing urge UI and mixed UI has been reported in several studies (Burgio et al., 1998; Nygaard et al., 1996).

Wilson et al. (2002) recommend that a PFMT program include 3 sets of 8–12 slow velocity maximal voluntary pelvic floor muscle contractions, 3 or 4 times a week, and continue for at least 15–20 weeks. The PFMT protocol suggested by the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) requires a daily minimum of 30–45 contractions, a duration of 10 s for each contraction, and at least 10 s of relaxation between contractions. It also informs women that improvement might not be apparent for 6–8 weeks after the start of PFMT (AWHONN, 2000).

2.3. UI severity

UI severity can be assessed with subjective and objective data obtained from a patient's UI history, voiding diary, pad test, physical examination, and/or urodynamic evaluation. In one study, a patient incontinence severity assessment was compared with a physician incontinence severity assessment that was based on a detailed history, a physical examination, and a review of a 3-day voiding diary. Researchers found that patients' reports were highly correlated with physicians' assessments on UI severity: the Spearman correlation coefficient was 0.62 ($p<0.001$) (Melville et al., 2003). Another study investigating a comparison between subjective and objective measures in evaluating UI severity revealed significant positive correlations. Researchers concluded that subjective measures can reasonably approximate objective measures of UI severity for women (Elser et al., 1995). Because information provided by patients on UI severity is considered reliable, several questionnaires have been designed to measure UI severity on the basis of patients' reports.

Sandvik et al. (1993) developed a simple severity index for use in epidemiological surveys. One computes Sandvik's UI severity index by multiplying the self-reported frequency of UI by the self-reported amount of urine leakage. Sandvik and colleagues validated the severity index against a 24-h "pad weighing" test in two studies. The reported correlations between the severity index and the pad-weighing test were 0.48 ($p<0.001$) (Sandvik et al., 1993) and 0.47 ($p<0.01$) (Sandvik et al., 2000). In one study, UI severity measured by Sandvik's UI severity index correlated well with patient severity report ($r=.61$, $p<0.001$) and physician assessment ($r=.66$, $p<0.001$) (Melville et al., 2003).

2.4. Knowledge and attitudes related to UI and PFMT

A patient's motivation and compliance with PFMT are essential to ensuring successful outcomes for PFMT. Thorough patient education can promote patient motivation for and compliance with PFMT (Gallo and Sasso, 1997). In Wilson and Herbison's (1998) study, lack of knowledge is the key reason for women of not performing PFMT. Kirkland et al. (2001) found that only 2% of the employed women with UI were aware of the national guideline for continence care in adults. Researchers have reported that patients' beliefs and knowledge related to UI, and misconceptions about the causes of UI and the availability of treatments, can affect their treatment-seeking behavior (Bush et al., 2001; Keller, 1999). Blanes et al. (2001) report that misconceptions about UI are common in the general population. Branch et al. (1994) have found a prevalent lack of knowledge related to UI among elderly people and people with low education status. UI is widely believed to be an inevitable and irremediable part of the normal aging process (Mitteness, 1990). Processing adequate knowledge does not ensure that women would perform PFMT correctly. Chiarelli et al. (2003) conducted a study to investigate women's knowledge regarding their correct practice of PFMT both before and during pregnancy. Researchers found that although the majority of women (91%) were aware of the adequate frequency of PFMT, only few women (15.7%) performed it at an adequate frequency before pregnancy, and about half (54.5%) did so during pregnancy.

Negative attitudes toward UI such as embarrassment, frustration, anxiety, annoyance, depression, and fear of odor are common (Mitteness, 1990). In one study, a majority of women with UI expressed difficulties in verbalizing their experiences (Bush et al., 2001). Ashworth and Hagen (1993) conducted in-depth interviews to investigate women's attitudes toward UI and found that their subjects perceived UI as a taboo topic, and attributed urine loss to a lack of personal control.

3. Method

A one-group pre-test–post-test quasi-experimental design was utilized. Data were collected before and after the intervention (PFMT program).

3.1. Subjects and setting

Advertisements of the PFMT program were posted in newspapers and on the bulletin board of a medical university hospital in Taipei, Taiwan. The advertisement included information on the purpose and schedule of the PFMT program, and on enrollment. There was no charge for the 114 participants, who were volunteers from the community. Questionnaires completed by participants who were male, pregnant, or had UTI were excluded. Eighty-two questionnaires were collected before and 64 after the PFMT program.

3.2. Instrument

The development of the UI and PFMT assessment scale was based on a literature review and discussions with women with UI, experienced nurses, and experts on women's health. The content of the scale included four sections: (a) personal characteristics, (b) knowledge related to UI and PFMT, (c) attitude toward UI and PFMT, and (d) UI severity. The investigators modified the scale after the intervention to include women's frequency of PFMT practice as well as the factors that affected their practice. The subscale of knowledge related to UI and PFMT, including 20 statements answered in a yes/no format, with a total score ranging from 0 to 20. Each correct answer counted as 1 point; each incorrect answer counted as 0 point. The content of the 20 statements included risk factors, treatment options and management strategies for UI, and the rationale, technique, and effect of PFMT. The subscale of attitude toward UI and PFMT included 24 statements and used a 5-point Likertscale. Of the 24 statements, 11 were related to attitudes toward UI and 13 were related to attitudes toward PFMT. A higher score of attitudes toward UI indicated that a woman possessed a more negative attitude toward UI. A higher score of attitudes toward PFMT indicated that a woman possessed a more positive attitude toward PFMT. Sandvik's UI severity index and the patient's self-perceived UI severity were incorporated into the questionnaire to represent UI severity. Because information provided by patients on UI severity has proved reliable, UI severity was mainly based on patients' reports in this study. Sandvik's UI severity index was computed by multiplication of the self-reported frequency of UI (4 levels) by the amount of urine leakage (2 levels). Frequency of UI was classified from 1 to 4 (1 = less than once a month, 2 = one or several times a month, 3 = one or several times a week, and 4 = every day and/or night). The amount of urine leakage was classified as 1 (a few drops or little) or 2 (more). The resulting index values (1–8) were further categorized into mild (1 or 2), moderate (3 or 4), and severe (6–8) (Sandvik et al., 1993). Self-perceived UI severity was determined by the patient's response to a question that asked her to rate the severity of UI on a 3-level scale: mild, moderate, and severe.

Content validity of the UI and PFMT assessment scale was determined and quantified by the index of content validity (CVI)—a proportion of the experts who endorsed items or scales as being content-valid (Waltz and Bausell, 1981). Ten experts (one obstetrician, two urologists, three women's health specialists, and four experienced nurses) reviewed content validity on the subscales of knowledge related to UI and PFMT and attitude toward UI and PFMT. Those experts gave each statement a grade based on its precision, feasibility, and appropriateness to the research aims. The grade system used a 4-point scale: "very appropriate–4 points," "appropriate–3 points," "inappropriate–2 points," and "very inappropriate–1 point" (Waltz and Bausell, 1981). Items are content-valid when 8 or more of the 10 experts grade the item as 3 or 4 points (Lynn, 1986). Any item was eliminated when fewer than 8 experts endorsed the statement as being content-valid. The final version of the UI and PFMT assessment scale included 50 statements. A convenience sample of 42 community women was utilized to test its internal consistency. Cronbach's alpha of the subscales, knowledge related to UI and PFMT, and attitude toward UI and PFMT, were between 0.7 and 0.9 after the elimination of 6 items (Table 1).

3.3. Procedures

PFMT was chosen as the intervention treatment in this study because it is a physical therapy that does not require extra assistant devices, and because it is the most convenient treatment for community women.

3.3.1. Training program

The subjects in this study participated in a 4-h PFMT program. The program was offered on four occasions to accommodate everyone, with the number of participants in each occasion ranging from 25 to 33. The PFMT program provided information on (a) anatomy and physiology of the urinary system, (b) risk factors of UI, (c) treatment options and management strategies for UI, (d) rationale of PFMT, and (e) technique and effect of PFMT. Methods addressing how to reduce pressure on

Table 1
Cronbach's alpha for the subscales of the UI and PFMT assessment scale

Scales	Statements	Alpha
Knowledge related to UI	10	0.73
Knowledge related to PFMT	10	0.84
Attitude toward UI	11	0.88
Attitude toward PFMT	13	0.88

the pelvic floor, and dietary alternatives that are less irritating to the bladder, were also discussed. Participants were taught to contract pelvic floor muscles for a period of 5 s, followed by a 10-s relaxation, and to gradually extend the period of each contraction to 10 s. A researcher helped participants recognize the pelvic floor muscles and practice contractions in different postures (sitting, standing, or lying down). The training followed a three-step plan: ''Recognizing pelvic floor muscles,'' ''Controlling pelvic floor muscles,'' and ''Putting PFMT into your lifestyle.''

3.3.2. Practice at home

Significant improvement in the UI condition typically requires 4–8 weeks of consistent PFMT practice (AWHONN, 2000). In this study, the effect of PFMT was assessed 8 weeks after the PFMT program because the greatest benefit occurs 8 weeks after start of PFMT (Bo et al., 1990). The researcher encouraged participants to perform PFMT for at least 30 min per day, to perform 90–120 daily contractions, to practice PFMT in various postures including lying down, sitting, and standing, and to integrate the practice into daily activities such as standing in line or sitting at a desk or in a car.

3.3.3. Data collection

A total of 114 questionnaires were distributed at the beginning of the PFMT programs and 82 completed questionnaires were collected. Thirty-two questionnaires were excluded because they were completed by participants who were male, pregnant, or suffering from UTI. A cover letter attached to each questionnaire informed the participants that consent was implied by completion of the questionnaire. The participants received a second questionnaire by mail 8 weeks later, followed by a postcard 2 weeks afterward to those who had not returned the second questionnaire. Sixty-four participants completed and returned second questionnaires.

3.4. Data analysis

The original data were coded as numbers and entered into Statistical Package of Social Sciences (SPSS) for Windows. To test the reliability of the scales, Cronbach's alpha was calculated. Simple frequency distribution and repeated inspection were used to verify the data. Frequency distributions were used to present participants' demographic and urologic characteristics and practice frequency of PFMT. Paired *t*-tests were utilized to test the effects of the PFMT program on UI severity and on women's knowledge and attitudes related to UI and PFMT.

4. Results

4.1. Demographic characteristics

Fifty-five participants reported the experience of involuntary loss of urine during the preceding 12 months. Of the 55 participants with UI who completed two questionnaires, 70% of them were age of 35–54 years (mean = 50.30, SD = 10.92) (Table 2). The education status for most participants ($n = 41$, 74.6%) included various levels ranged from some high school to obtaining a university or college degree. The majority of the participants were married ($n = 49$, 89.0%) and not employed ($n = 34$, 68.0%).

4.2. Urologic characteristics

Of the 55 participants suffering from UI, 82% had experienced UI for more than 12 months and 78% experienced UI when their abdominal pressures increased. These percentages were calculated with some women excluded who did not respond to the question regarding the length of time experiencing UI and major circumstances under which they experienced UI. The distributions of UI severity as measured by Sandvik's UI severity index and perceived by women before and after PFMT are listed in Table 3.

Table 2
Demographic characteristics for participants with urinary incontinence ($n = 55$)

	Participants with UI ($n = 55$)	
Variables	*n*	%
Age		
35–44	16	29.1
45–54	22	40.1
55–64	8	14.5
65–74	8	14.5
⩾75	1	1.8
Body mass index (BMI = body weight $_{kg}$/(body height $_{m}$)^2)		
<20 Underweight	7	12.7
20–25 Normal	38	69.1
>25 Overweight	10	18.2
Parity		
One	3	5.9
Two or three	38	74.5
Four and above	10	19.6
Missing	4	
Delivery method		
Vaginal delivery	42	89.4
Cesarean section	5	10.6
Missing	8	

4.3. Effects of the PFMT program

Women's UI severity as measured by Sandvik's UI severity index ($t = -2.04$, $p = .046$) and as perceived by women ($t = -2.70$, $p = .01$) improved after PFMT. A statistically significant difference was found in the knowledge related to UI and PFMT for women with UI after the PFMT program intervention ($t = -3.55$, $p = .001$). No statistically significant difference was found in women's attitudes toward UI and PFMT (Table 4). Women without UI were excluded from this analysis because the focus of this study is to investigate the effects of the PFMT program for women with UI. Based on women's self-reported frequency of PFMT practice, women are divided into three groups: 30–40 min per day, 1–2 h per week, and 1–2 h per month. Paired *t*-tests were conducted to test the effects of the PFMT program on women's UI severities for each group. Statistically significant differences were found for Sandvik's UI severity index ($t = -2.99$, $p = 0.01$) and self-reported UI severity ($t = -2.19$, $p = 0.05$) in the group who performed PFMT 30–40 min per day (Table 5).

Table 3
Urologic characteristics ($n = 55$)

Variables	Before intervention		After intervention	
	n	%	*n*	%
Major circumstance of urinary incontinence				
Increasing abdominal pressure	38	77.6	42	77.8
Urge, poor control	3	6.1	5	9.3
Drops of urine leakage frequently	5	10.2	3	5.5
Complex circumstances	3	6.1	4	7.4
Missing	6		1	
Length of experiencing urinary incontinence				
Within a month	2	4.4	1	2.1
3–6 months	4	8.9	3	6.1
6–12 months	2	4.4	3	6.1
More than 1 year	37	82.3	42	85.7
Missing	10		6	
Sandvik's UI severity = (frequency of UI) × (amount of urine leakage)				
Mild	18	32.7	28	50.9
Moderate	20	36.4	13	23.6
Severe	17	30.9	14	25.5
Self-reported UI severity				
Mild	26	53.0	30	60.0
Moderate	14	28.6	14	28.0
Severe	9	18.4	6	12.0
Missing	6		5	

4.4. PFMT practice and self-perceived improvement

Of the 55 participants with UI, 33 (80.5%) indicated that they could correctly contract their pelvic floor muscles; 28 (58.4%) reported improvements after performing PFMT. Of the 55 participants with UI, 27% performed PFMT 30–40 min per day, 33% and 27% of them reported that they performed PFMT 1–2 h per week and 1–2 h per month, respectively.

5. Discussion

The majority of the women who participated in the PFMT programs had an education status above high school. This result is in agreement with those of two other Taiwan studies showing that women with higher education status are more likely to seek treatment than women with lower status (Huang et al., 1997; Tseng et al., 2000). The finding that a majority of women with UI ($n = 37$, 82.3%) experienced it for more than 12 months is consistent with the findings of previous studies showing that women tend to seek treatment after UI has existed for a long period (Lin and Dougherty, 2003). Most women in this study ($n = 38$, 77.6%) reported that they experienced UI when they performed activities that increased abdominal pressure, this result is consistent

Table 4
Effects of a PFMT program ($n = 55$)

Variables	Before intervention mean (SD)	After intervention mean (SD)	Ranges	Difference	*t*	*p*
Sandvik's UI severity	1.98 (0.80)	1.75 (0.84)	1–3	−0.23	−2.04	0.046
Self-reported UI severity	1.70 (0.79)	1.52 (0.72)	1–3	−0.18	−2.70	0.01
Knowledge related to UI	8.27 (1.18)	8.78 (1.29)	4–10	0.51	−2.60	0.012
Knowledge related to PFMT	7.78 (1.16)	8.32 (0.95)	4–10	0.54	−2.81	0.007
Knowledge related to UI and PFMT	16.05 (1.90)	17.11 (1.79)	10–20	1.06	−3.55	0.001
Attitude toward UI	47.67 (4.67)	47.29 (5.22)	37–55	−0.38	−0.61	0.54
Attitude toward PFMT	54.20 (7.10)	53.82 (6.24)	32–65	−0.38	−0.42	0.68
Attitude toward UI and PFMT	101.91 (10.34)	101.29 (9.03)	77–120	−0.62	−0.55	0.58

Table 5
Effects of a PFMT program on UI severity delineated by frequency of PFMT practice ($n = 42$)

Variables	Before intervention mean (SD)	After intervention mean (SD)	Ranges	Difference	t	p
Women who practice PFMT 1–2 h/month ($n = 13$)						
Sandvik's UI severity	1.84 (0.90)	1.69 (0.85)	1–3	−0.15	0.69	0.50
Self-reported UI severity	1.36 (0.50)	1.18 (0.40)	1–2	−0.18	−1.49	0.17
Women who practice PFMT 1–2 h/week ($n = 16$)						
Sandvik's UI severity	1.69 (0.79)	1.56 (0.73)	1–3	−0.13	−0.62	0.54
Self-reported UI severity	1.35 (0.50)	1.35 (0.50)	1–2	0.00		
Women who practice PFMT 30–40 min/day ($n = 13$)						
Sandvik's UI severity	2.38 (0.77)	1.62 (0.77)	1–3	−0.76	−2.99	0.01
Self-reported UI severity	1.82 (0.87)	1.36 (0.67)	1–3	−0.46	−2.19	0.05

with the findings of several studies that showed stress UI to be the most common type of UI among community women (Hannestad et al., 2000; Yu et al., 1994). The result may not be generalized to the greater population in Taiwan because the study used a convenience sample.

Studies conducted in Taiwan demonstrated that women's UI severity was greater in more participants recruited from clinics (Huang et al., 1997) than from the community (Yu et al., 1994). In a 1994 study by Yu et al., 76.2%, 16.4%, and 7.4% of community women with UI experienced mild, moderate, and severe UI, respectively. In another study, 64.4% of women with UI reported that they experienced mild to moderate UI, and 35.6% experienced severe to very severe symptoms (Huang et al., 1997). In this study, 32.7%, 36.4%, and 30.9% of women with UI experienced mild, moderate, and severe UI (Sandvik's UI severity index), respectively, before the intervention. Because the participants of this study were community volunteers, their very willingness to volunteer was perhaps predictive of a certain motivation to participate in a PFMT program. Therefore, UI severity for participants in this study was similar to that of the women in the study by Huang et al., and the finding further supports the belief that women's behavior in seeking help are associated with their UI severity (Lin and Dougherty, 2003; Yu et al., 2003). In this study, 53%, 28.6%, and 18.4% of the women self-reported their UI severity as mild, moderate, and severe, respectively—less severe than the severity measured by Sandvik's UI severity index. This finding is consistent with that of Hellstrom et al. (1991) in that women tend to underestimate their UI severity. This phenomenon also is a reasonable explanation for their delays in seeking help.

Women's UI severity as assessed by Sandvik's UI severity index or as perceived by participants shows statistically significant differences after the intervention. Most women (58%) with UI expressed a feeling of improvement after PFMT, a positive effect consistent with the results of previous studies (Bo et al., 1999; Burgio et al., 1998; Chen et al., 1999). Wilson et al. (2002) suggested 3 sets of 8–12 contractions, 3–4 times a week. In this study, women were encouraged to perform at least 90–120 contractions per day, 30 min per day. Only 27% of the women with UI performed PFMT 90–120 contractions per day (30–40 min per day), 33% and 27% of them reported that they performed PFMT 1–2 h per week and 1–2 h per month, respectively. Women who experienced more severe UI tended to practice PFMT more frequently. In fact, women who practiced PFMT more frequently showed better improvement than those who practiced less frequently (Table 5). These results are consistent with Kim's (2001) study that showed women who performed PFMT 90–100 contractions per day experience greater improvement than those who perform 30–40 contractions. In clinical practice, PFMT programs still lack consistency in the recommended number of contractions per day and training sessions per week (Wilson et al., 2002). Bo and colleagues report significantly greater improvement in the "intensive" treatment group than in the "standard" treatment group (Bo et al., 1990). However, another study found no significant difference between intensive and standard treatment groups (Wilson and Herbison, 1998). More studies are needed to explore the most effective intensity regimen of PFMT.

Gerard (1997) reports that group training is an effective means of educating women about UI management. Similar effects of inpatient and outpatient conservative management of UI are evident in a randomized, controlled trial in which symptoms of UI improved in both groups with no clear benefit of inpatient over outpatient management (Ramsay et al., 1996). In this study, group training of PFMT in the community showed itself to be an effective and economic means of offering the benefits of PFMT. The effects of PFMT program on women's knowledge related to UI and PFMT are statistically significant. Because of the positive effects, PFMT program should be regularly initiated in the community. Kirkland et al.

(2001) found that 85% of women with UI reported a desire for more information about UI. In addition to PFMT, the programs should give participants information about the risk factors of UI, preventive interventions, good urinary hygiene, adequate daily fluid intake, good bladder habits, and appropriate management strategies. Also, programs should emphasize the necessity that women seek professional evaluation and management when they encounter problems related to poor bladder control. In Taiwan, an insufficient number of studies have investigated the effects of PFMT programs and only a limited number of professionals possess expertise in providing adequate care for women with UI. Knowledge is an important factor in managing UI both for women with UI and for healthcare professionals. Widespread dissemination of information on PFMT programs will increase the number of professionals who command the expertise to manage this problem. In addition to content tailored for patients with UI, PFMT programs designed for professionals should be developed, featuring information related to other treatment options and to effective UI management strategies, thus increasing the numbers of well-trained health care personnel who can offer regular lectures, training courses, and counseling services related to UI. The well-trained professionals also need to regularly update with new information and communicate with one another in the ongoing continence care for women. It is clear that both professionals and the women they serve can greatly benefit by the initiation of such programs.

Attitudes toward UI tended to be negative, which is consistent with the findings of several studies (Huang et al., 1997; Keller, 1999; Liao et al., 1999). The effects of the PFMT program on women's attitudes toward UI and toward PFMT are not statistically significant, a result perhaps explicable by the small sample size. Although content validity was established and reliability (internal consistency) was obtained for the UI and PFMT assessment scale, further refinements for this instrument are required. Since UI is a sensitive topic, participants in this study may have answered the questions with an inherent bias related to social and cultural perceptions. Additionally, if a woman does not know the exact nature of a condition (UI) or a recommended exercise (PFMT), it is hard for her to express the possible negative or positive attitude toward it.

This study demonstrated positive effects of a PFMT program on UI severity and on women's knowledge related to UI and PFMT. It also showed that group training is an effective means of offering a PFMT program. In keeping with the understanding that improving women's knowledge regarding UI and PFMT will increase their abilities to manage UI, the value of delivering PFMT programs in community is precise. The results of this study lead us to recommend greater efforts toward increasing awareness of this common health concern, and of the helpful effects of PFMT, which we hope will further lead to greater use of conservative treatments to manage UI.

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