

# Effectiveness of a Behavioral Intervention Program for Urinary Incontinence in a Community Setting

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**Purpose.** The purposes of this study were to examine the effectiveness of a behavioral intervention program combining pelvic floor muscle exercise with bladder training for urinary incontinence and also to conduct follow-up assessment after self-training.

**Methods.** This study was conducted using a non-equivalent control group, pretest-posttest design. The subjects were 60 middle-aged women (control group, n=30; intervention group, n=30) who experienced an episode of urinary incontinence at least once a week. The program was run over a 4 week period (once a week) and composed of urinary incontinence education, pelvic floor muscle exercise, and bladder training.

**Results.** Overall, there was a significant difference in urinary incontinence symptoms and psycho-social well-being related to urinary incontinence between the treatment and control group. Of the variables, weekly leakage frequencies, leakage amounts on each occasion, leakage index, frequencies of nocturia, and quality of life were significantly different between the groups. Follow-up assessment (9th week) indicated that overall incontinence symptoms and psycho-social well-being were significantly different between the posttest and follow-up assessments. Most variables of incontinence symptoms and psycho-social well-being were significantly improved at follow-up assessment versus posttest.

**Conclusions.** The program was overall effective in terms of relieving symptoms and improving psycho-social well-being related to urinary incontinence, and this effect continued after a 4-weeks self-training period. In the respect that this is a community-based application study, the results can be meaningful and applicable.

**Key Words :** Urinary incontinence, exercise therapy, bladder training program, pelvic floor muscle

## INTRODUCTION

Urinary incontinence is defined as the involuntary leakage of an objectively demonstrable amount of urine from bladder and can be classified as stress, urge, or mixed incontinence. The common treatments for urinary incontinence include surgery, drug therapy, and behavioral interventions (Urinary Incontinence in Adults

Guideline Update Panel, 1996). Although surgery and drug therapy used to be the preferred treatments, behavioral intervention is now more frequently adopted due to its potential benefits with few risks and no side effects (Sampselle & Hines, 1999). The most recognized behavioral interventions for urinary incontinence are pelvic floor muscle(PFM) exercise and bladder training.

PFM exercise aims to control periurethral muscles to occlude the urethra during physical activity, while blad-

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der training aims to extend the interval between voluntary voiding (Alewijnse, Metsemakers, Mesters, & Borne, 2003; Burgio, 2004). Both exercises are known to be effective in treating stress and urge incontinence (Burgio, 2004).

In Korea, approximately 37–60% of women experiences urinary incontinence (Choi & Baik, 1998) and 64–65% of elderly women show symptoms of urinary incontinence (Park, Kwon, & Kang, 2001). The most common types of urinary incontinence in the middle aged Korean women are the stress and mixed type (Choi & Baik, 1998). Therefore, the simultaneous application of PFM exercise and bladder training might be effective at this condition.

Investigators indicated that urinary incontinence is significantly improved by behavioral interventions, but most patients were not completely dry (Shumaker, Wyman, Uebersax, McClish, & Fantl, 1994). Nevertheless the majority of patients were satisfied with the clinical progress achieved after behavioral intervention. For this reason, many investigators have re-evaluated the definitions of success after behavioral intervention, and the findings of those studies suggest that a patient's perspective of quality of life and well-being should be used as measures of intervention outcome (Burgio, 2004; Shumaker et al., 1994). Another consideration is that most behavioral intervention programs for urinary incontinence are provided by physicians in clinical settings, and therefore, are limited by a lack of provider availability and times (Burgio, 2004).

From the literature reviews, we noticed that many of related studies had following methodological weaknesses; 1) having no control group (Publicover & Bear, 1997; Bae et al., 2003; Kim, 2003), 2) not providing any intervention upon the control group even if there were the control group, thus threatening the study validity (Diokno et al., 2004; Sampselle et al., 2005), and 3) providing the treatments merely once or within short-term. Therefore, it was recognized that further complementary studies were needed to confirm the effectiveness of behavioral programs.

The present study was conducted to examine the effectiveness of a behavioral intervention program combining PFM exercise with bladder training using an improved study design, i.e., having a control group with a proper intervention (general health education in this study). In addition, adherence strategies to sustain the self-practice of this intervention were also introduced and follow-up

evaluations were performed after a period of self-training. The specific purposes were to evaluate: 1) the effectiveness of this program on urinary incontinence symptoms, such as, on leakage frequency and amount, the frequency of nocturia, leakage index, and the voluntary voiding frequency and interval, 2) the effectiveness of this program on psycho-social well-being (quality of life and depression) related to urinary incontinence, 3) the proportion of subjects who continued self-training after terminating the program, and 4) whether outcome variables were improved at follow-up assessment compared to the test conducted immediately after program termination.

## METHODS

### *Study design and subjects*

This study was conducted using a non-equivalent control group, pretest-posttest design. The subjects of the present study were community dwelling 60 middle-aged women (38–59 years old) who experienced an episode of urinary incontinence at least once a week. Subjects with any of following characteristics were excluded: 1) having a past history of medications or surgery for urinary continence, 2) presently under hormone or drug therapy for urinary incontinence, 3) presently under therapy for obstetric/gynecologic, or urologic disease, 4) the presence of proteinuria or glucosuria, 5) the presence of mobility problems or an abnormal blood pressure, 6) presently taking diuretics, or 7) an inability to keep a diary. These factors are known to affect the incidence and severity of urinary incontinence, and therefore could be the extraneous variables for the intervention effects.

### *Procedures*

Sixty voluntary participants were recruited through advertisements in 6 churches located in Incheon, South Korea. They were informed that data would be analyzed and published anonymously. Subjects were then assigned conveniently to the control ( $n=30$ ) or treatment groups ( $n=30$ ). Prior to program start, subjects were asked to keep a diary of voiding habits for at least 2 days.

It has been reported that a diary of voiding habits is a reliable and valid tool to evaluate urinary incontinence (Lentz & Stanton, 1992; Pfister, 1999; Dmochowski et al., 2005). The recommended duration of keeping diary

was 1–7 days (Hay-Smith et al., 2001). However, studies showed that there was a high correlation between the short-term (2–3 days) and relatively long-term (7 days) diary in a sense of evaluating urinary incontinence (Lentz & Stanton, 1992; Dmochowski et al., 2005). In the present study, 2-days voiding diaries were recorded with a consideration of lightening a burden of recoding and increasing accuracy.

The program was run over a 4 week period (once a week) by the first author. According to literature review, PFM exercises were applied for mostly 6–12 weeks, 1 week at the shortest and 12 week at the longest (Hay-Smith et al., 2001). Because the purposes of our study were to clarify the immediate effects of the program as well as self-training compliance rates, 8-weeks training (4-weeks of the intensive training and 4-weeks of the self-training) was conducted under the consideration of drop-out rate.

For the treatment group, baseline data (general background, obstetric/gynecological history, life style-related variables, blood pressure, height and weight, symptoms, and psycho-social well-being related to urinary incontinence) were collected during the first program meeting by the first author. In addition, subjects were educated regarding the causes, symptoms, diagnoses, and treatments of urinary incontinence. During 1st week, the PFM exercise was demonstrated and subjects were encouraged to practice the exercise repeatedly during the session. An audiocassette tape of the exercise, which was recorded by the authors, was provided to subjects for self-practice at home. For bladder training, intervals between voluntary voiding were scheduled based on subjects' daily voiding pattern.

On the 2nd, 3rd, and 4th weeks (once a week, 1 hour session), the PFM exercise was demonstrated again, and practiced repeatedly. In addition, the interval between voluntary voiding for bladder training was re-adjusted based on the voiding diary of the previous week.

For the control group, baseline data were also collected by the first author at the 1st program week. However, instead of PFM exercise and bladder training, general health education (postmenopause symptoms, stress management, and life styles for health promotion) was provided to this group, again once a week (1-hour session) for 4 weeks.

At the meeting on the 5th week, outcome variables (symptoms and psycho-social well-being related to urinary incontinence) were evaluated in both the control

and treatment group by the first author. At this meeting, the benefits of self-practice using the audiocassette tape were emphasized to the treatment group. Since then, feedback and reinforcement for self-training provided to each subject in the treatment group through weekly telephone interview by the first author. On the 9th week, follow-up assessments of the self-training compliance rate, and on symptoms and psycho-social well-being related to urinary incontinence in the treatment group were conducted by the first author who fulfilled the intervention, self-training management, and 5th week assessments.

### *The behavioral intervention program*

The program was composed of urinary incontinence education, PFM exercise, and bladder training. The contents of the education program included the causes, symptoms, diagnoses, and treatments of urinary incontinence, the locations and functions of PFM and methods of PFM exercise and bladder training.

The PFM exercise used in the present study was developed by the authors on the basis of methods employed in previous studies by Dougherty and her colleagues (1989) and Lee (1993). According to our protocol, pelvic floor muscles were quickly contracted and held for 10 seconds and then relaxed for 10 seconds, i.e., 'quick and hold' contractions (Gallo, 1997; Sherman, 1997). The most prevalent contraction holding time reported in literatures ranged from 4 seconds (Ramsay, 1990) to 30 seconds (Hahn, 1991). This contraction-relaxation was repeated 10 times a day during the 1st week, and increased to 20, 30, and 40 times a day during the 2nd, 3rd, and 4th weeks, respectively. The whole exercise procedure was recorded on audiocassette tape.

The bladder training method used in the present study was developed by modifying O'Brien and her colleagues' program (1991). This training aims at extending voluntary voiding intervals gradually. Based on voiding habits, the interval between voluntary voiding was agreed by contract between the author and each subject. This interval was then gradually extended, in 20-30 minute increments every week until the voiding interval reached 3–4 hours.

### *Measurements*

Symptoms related to urinary incontinence, the frequency of leakage episodes in a week, the amount of urine leakage on each occasion, the frequency of nocturia, the frequency of micturition, and voluntary void-

ing intervals were measured using voiding diary entries. Because the amount of urine leakage might be very obscure to assess objectively, we asked to estimate by teaspoon; the question was “approximately how many teaspoons of urine you think were leaked on your underwear?”

In addition, the leakage index was also evaluated using Lee’s Korean leakage index scale (1993), which was developed from the Hendrickson’s scale (1981). This scale was designed to assess how often subjects experienced wet episodes in 18 special situations, verified as the most predictable situations to induce urine leakage. Each situation constitutes one item, and consequently total 18 items. This scale is a 5-point scale (from 0 to 4). The summed scores can be evaluated as 0–25 mild, 25–48 moderate, and 49–72 severe leakage. The content validity of the modified scale was verified by Lee (1993). The reliability has also been examined on a number of occasions, and during the present study (Chronbach  $\alpha$  = 0.83–0.85).

For psycho-social well-being related to urinary incontinence, quality of life and depression were measured. Quality of life was evaluated using a 12-item scale developed by Kim and Lee (1999). This scale produces total score ranging from 12 to 48 (4-point scale): the higher the score, the higher the quality of life. The content validity of this scale was examined by Kim and Lee (1999), and its reliability has been also confirmed on several occasions, and in the present study (Chronbach  $\alpha$  = 0.83–0.93). Depression was measured using the 30-item Geriatric Depression Scale (GDS) that was originally developed by Yesavage and his colleagues (1983) and standardized with Korean-version by Kim (1999). The reason to apply GDS upon middle-aged women in the present study was its simplicity. In addition, no items of GDS were found to be suitable only for geriatric subjects, interpreting the general applicability of this scale. The content validity on Korean version of GDS was verified by 2 nursing professors. In addition, reliability of this scale was also verified in the present study (Cronbach  $\alpha$  = 0.87).

### Statistical analysis

Data analysis was performed using a SPSS/PC program. Descriptive statistics were used to describe subjects’ general characteristics. The Chi-square or t-test were used to examine the homogeneity of baseline data in the control and treatment groups. MANOVA and

ANOVA were used to compare outcome variables (symptoms and psycho-social well-being related to urinary incontinence) of the two groups immediately after the program termination (posttest). Repeated measures MANOVA and ANOVA were used to compare treatment group outcome variables at posttest and follow-up.

## RESULTS

### General and urinary incontinence-related characteristics of subjects

The mean ages of subjects in the treatment and control groups were 51.73 ( $\pm 9.12$ ) and 51.77 ( $\pm 8.50$ ) years, respectively. All subjects were married; 70% currently under the marital status and 30% widowed in both groups.

Mean systolic/diastolic blood pressure were 124.33 ( $\pm 15.01$ )/75.00 ( $\pm 9.38$ ) and 123.33 ( $\pm 15.82$ )/75.67 ( $\pm 8.58$ ) mmHg, body weights 63.11 ( $\pm 6.58$ ) and 63.40 ( $\pm 5.23$ ) Kg, daily frequencies of coffee drinking 0.34 ( $\pm 0.25$ ) and 0.36 ( $\pm 0.28$ ) cups, and monthly frequencies of drinking alcohol 0.23 ( $\pm 0.63$ ) and 0.23 ( $\pm 0.57$ ) in the treatment and control groups, respectively. All of the subjects in the present study were non-smokers.

All subjects had experienced childbirth. Mean parity numbers were 3.20 ( $\pm 1.61$ ) and 3.23 ( $\pm 1.19$ ), vaginal birth 2.80 ( $\pm 1.77$ ) and 2.93 ( $\pm 1.39$ ), Caesarean operation 0.40 ( $\pm 0.56$ ) and 0.30 ( $\pm 0.53$ ), and episiotomy 0.53 ( $\pm 0.68$ ) and 0.47 ( $\pm 0.78$ ) in the treatment and control group, respectively. In addition, 23.3% and 30% of subjects reported previous uterine disease, 13.3% and 6.7% previous hysterectomy, and 36.7% and 40.0% were in a postmenopausal state in the treatment and control groups, respectively.

The mean durations of incontinence were 37.4 ( $\pm 29.33$ ) and 34.00 ( $\pm 20.63$ ) months, weekly leakage frequencies 2.32 ( $\pm 1.39$ ) and 2.17 ( $\pm 1.51$ ), leakage amounts at an occasion 1.50 ( $\pm 0.68$ ) and 1.47 ( $\pm 0.63$ ) tea spoons, daily voiding frequencies 5.50 ( $\pm 1.31$ ) and 5.17 ( $\pm 1.15$ ), voiding interval 3.07 ( $\pm 0.73$ ) and 3.23 ( $\pm 0.66$ ) hours, and frequencies of nocturia 1.30 ( $\pm 0.84$ ) and 1.00 ( $\pm 0.64$ ) in the treatment and control groups, respectively. For the treatment group, 10% of subjects had a feeling of residual urine all the time, 26.7% frequently, and 63.3% not at all. For the control group, 10% of subjects had a feeling of residual urine all the time, 10% frequently, and 80% not at all. Leakage indexes averaged 14.37 ( $\pm 5.64$ ) and 14.53 ( $\pm 7.26$ ) in

the treatment and control groups, respectively.

### Homogeneity test

No significant differences were observed in general characteristics, obstetric/gynecological history, or life-style variables of the two groups: age, educational background, marital status, menstruation status, frequency of parity, frequency of episiotomy, past history of uterine disease or surgery, and frequency of drinking coffee and alcohol.

Symptoms and psycho-social well-being related to urinary incontinence were also homogeneous in the two groups: duration of symptoms, weekly leakage frequency, leakage amount, leakage index, daily frequency of voluntary voiding, frequency of nocturia, interval of voluntary voiding, feeling of residual urine, quality of life, and depression.

### Impact effects of the program (posttest)

During the program, no drop-out occurred. Since the

dependent variables (symptoms and psycho-social well-being related to urinary incontinence) were multiple and inter-related, MANOVA was used to compare these variables in the treatment and control groups immediately after program termination. Prior to performing this analysis, we ascertained whether data satisfied the basic assumptions required for MANOVA (Box M=2.97,  $F=0.98$ ,  $p=0.42$  for incontinence symptoms; Box M=2.78,  $F=0.90$ ,  $p=0.44$  for psycho-social well-being). ANOVA was used to determine which variables were significantly different between the two groups after intervention.

Overall, there was a significant difference in incontinence symptoms between the treatment and control group after terminating the program ( $F=9.90$ ,  $p=0.000$ ). Of the symptoms, weekly leakage frequency ( $F=28.90$ ,  $p=0.000$ ), leakage amount at a time ( $F=55.26$ ,  $p=0.000$ ), leakage index ( $F=39.29$ ,  $p=0.000$ ), and frequency of nocturia ( $F=11.80$ ,  $p=0.001$ ) were significantly different. On the other hand, voiding frequencies ( $F=3.60$ ,

**Table 1.** Impact Effects of the Intervention Program on the Symptoms and Psycho-social Well-being Related to Urinary Incontinence (5th week measurements)

Impact effects of intervention on the symptoms related to urinary incontinence				
MANOVA				
Hotelling's T			F-value	p-value
1.12			9.90	0.00
ANOVA				
Variables	Experiment (n = 30)	Control (n = 30)	F-value	p-value
	M $\pm$ SD	M $\pm$ SD		
Frequency of urine leakage per week	0.67 $\pm$ 0.80	2.15 $\pm$ 1.29	28.90	0.00*
Amount of urine leakage at a time	0.52 $\pm$ 0.50	1.47 $\pm$ 0.49	55.26	0.00*
Leakage index	4.50 $\pm$ 5.49	13.53 $\pm$ 5.67	39.29	0.00*
Frequency of nocturia per day	0.37 $\pm$ 0.49	0.87 $\pm$ 0.63	11.80	0.00*
Frequency of voluntary voiding per day	4.50 $\pm$ 0.68	4.93 $\pm$ 1.05	3.60	0.03
	(range: 1–4)	(range: 3–4)		
Interval of voluntary voiding	3.63 $\pm$ 0.49	3.37 $\pm$ 0.65	2.94	0.05
Impact effects of intervention on the psychosocial well-being related to urinary incontinence				
MANOVA				
Hotelling's T			F-value	p-value
0.29			8.22	0.00
ANOVA				
Variables	Experiment (n = 30)	Control (n = 30)	F-value	p-value
	M $\pm$ SD	M $\pm$ SD		
Quality of life	34.50 $\pm$ 1.85	32.30 $\pm$ 2.29	16.72	0.00*
Depression	2.97 $\pm$ 1.25	3.27 $\pm$ 1.14	0.95	0.17

p-value: one-tailed test

Significant test:  $p \leq 0.01$

$p=0.03$ ) and intervals ( $F=2.94$ ,  $p=0.05$ ) were not significantly different (Table 1). Due to the possibility of a type I error resulting from the repeated usage of the same data for multiple analyses, a probability level of  $\alpha=0.01$  was interpreted as significant for the ANOVA analysis.

Overall, a significant difference in psycho-social well-being related to urinary incontinence was found between the two groups immediately after terminating the program ( $F=8.22$ ,  $p=0.00$ ). Of psycho-social well-being variables, quality of life was found to be significantly different ( $F=16.72$ ,  $p=0.000$ ), whereas depression was not ( $F=0.95$ ,  $p=0.17$ ).

### Follow-up assessment

Follow-up assessment was conducted after 4-weeks of self-training (on the 9th week). Self-training had been performed using the audiocassette tape provided by the first author and the need for self-training was reinforced by telephone after program termination. The results obtained showed that 21 (70%) of the 30 subjects contin-

ued PFM exercise and bladder training at home and that 9 (30%) had discontinued self-training.

To compare the symptoms and psycho-social well-being related to urinary incontinence at posttest and follow-up, we used repeated measure MANOVA and ANOVA. Because this analysis was conducted with the aim of examining 'whether outcome variables were improved at follow-up assessment compared to the test conducted immediately after program termination?' (study purpose 4), 9 subjects who discontinued self-training were also included in this analysis.

In spite of small numbers of subjects ( $n=30$ ) in this analysis, MANOVAs were used because the dependent variables were multiple, inter-related, and repeatedly measured. We ascertained whether data satisfied the basic assumptions required for repeated measure ANOVA.

Overall, the symptoms related to urinary incontinence were significantly different at posttest and follow-up (Wilks Lambda=0.04,  $p=0.00$ ) (Table 2). Of the variables, leakage index ( $F=13.25$ ,  $p=0.00$ ) and the daily fre-

**Table 2.** Comparison on the Symptoms and Psycho-social Well-being Related to Urinary Incontinence between Posttest (5th week) and Follow-up (9th week) (N = 30)

Effects on the symptoms related to urinary incontinence				
RM-MANOVA				
	Wilks Lambda		F-value	p-value
	0.04		98.27	0.00
RM-ANOVA				
Variables	5 week M $\pm$ SD	9 week M $\pm$ SD	F-value	p-value
Frequency of urine leakage per week	0.62 $\pm$ 0.81	0.47 $\pm$ 0.68	2.35	0.07
Amount of urine leakage at a time (teaspoon)	0.52 $\pm$ 0.50	0.33 $\pm$ 0.44	3.35	0.04
Leakage index	4.50 $\pm$ 5.49	2.33 $\pm$ 4.27	13.25	0.00*
Frequency of nocturia per day	0.37 $\pm$ 0.49	0.20 $\pm$ .41	3.92	0.03
Interval of voluntary voiding per day	4.50 $\pm$ 0.68 (range: 3–4)	4.03 $\pm$ 0.56 (range: 3–8)	16.52	0.00*
Interval of voluntary voiding (hour)	3.63 $\pm$ 0.49	6.07 $\pm$ 0.89	256.86	0.00*
Effects on the psychosocial well-being related to urinary incontinence				
RM-MANOVA				
	Wilks Lambda		F-value	p-value
	0.58		10.21	0.00
RM-ANOVA				
Variables	5 week M $\pm$ SD	9 week M $\pm$ SD	F-value	p-value
Quality of life	34.50 $\pm$ 1.85	35.47 $\pm$ 1.41	9.35	0.00*
Depression	2.97 $\pm$ 1.25	2.30 $\pm$ 1.12	10.55	0.00*

p-value: one-tailed test

Significant test:  $p \leq 0.01$

quency of voluntary voiding ( $F=16.52$ ,  $p=0.00$ ) were significantly reduced, and the voluntary voiding interval was significantly increased ( $F=256.88$ ,  $p=0.00$ ). Frequencies of nocturia and leakage episodes and amounts were reduced at follow-up, but these decrements were not statistically significant ( $F=3.92$ ,  $p=0.03$ ;  $F=2.35$ ,  $p=0.07$ ;  $F=3.34$ ,  $p=0.04$ , respectively). Due to the possibility of a type I error resulting from the repeated usage of the same data for multiple analyses, a probability level of  $\alpha=0.01$  was interpreted as significant.

Overall, psycho-social well-being was significantly improved at follow-up versus posttest (Wilks Lambda=0.58,  $p=0.00$ ). Both psycho-social well-being variables, i.e., quality of life ( $F=9.35$ ,  $p=0.01$ ) and depression ( $F=10.55$ ,  $p=0.00$ ), found to be significantly improved at follow-up versus posttest (Table 2).

## DISCUSSION

Combined PFM exercise with bladder training found to have a significant impact effect (5th week measurements) on reducing the frequencies and amounts of urine leakage, leakage indexes, and frequencies of nocturia. However, the voluntary voiding frequency and interval were not significantly different in the treatment and control groups after the program. In previous other studies, individual application of PFM exercise or bladder training reduced leakage index scores, leakage frequencies and amounts, voluntary voiding frequencies and intervals, and frequencies of nocturia (Choi, Sung, & Hong, 1999; Sampsel, 2000; Payne, 2000).

Insignificant effects of PFM exercise and bladder training on voluntary voiding frequency and interval as shown in the present study might be due to the age of subjects. As including mostly middle-aged women in the present study, there were high proportions of stress and mixed type (merged type of stress and urgent) of urinary incontinence (Lee, 1998). Even in the case of mixed type, however, the proportion of urgent incontinence might be low due to the majority of middle-aged subjects in the present study. Therefore, the frequency and intervals of voluntary voiding, the major symptoms of the urgent urinary incontinence, might not be significantly improved after the program in this middle-aged group of the present study. Further studies are needed to examine these variables.

Non-invasive behavioral interventions have been recommended as first-choice treatments for urinary inconti-

nence (Alewijnse et al., 2003). The success of behavioral intervention programs for urinary incontinence depends on the active participation and strong motivation of subjects. In particular, adherence to behavioral protocols is essential to produce noticeable changes over a long period (Burgio, 2004).

In the present study, the self-training procedure was described to subjects using an audiocassette tape and this was reinforced weekly by telephone. At the follow-up assessment, 30% of subjects in the treatment group were found to discontinue the exercise in spite of such maintenance strategies. However, most symptoms and psycho-social well-being were significantly improved at follow-up compared to posttest in the present study.

Providing feedback and reinforcement by telephone is commonly recommended strategy to promote adherence to exercise (Alewijnse et al., 2003; Burns, Pranikoff, Nochajski, Hadley, Levy, & Ory, 1993) although the effectiveness of this strategy on adherence has not been examined. Such external reinforcements seem to be effective at least for a short period, because the discontinuance rate in the present study was lower (30%) than that of other studies, which did not use maintenance strategies (50–85%) (Cammu & Nylen, 1995). In order to maintain the desired behaviors over an extended time and create a training habit, internal reinforcement is necessary. Strategies based on internal reinforcement to promote adherence to urinary incontinence training need to be developed.

The results of the present study are limited in terms of their generalized applicability due to methodological weakness, namely, a small sample size and the convenient assignment of subjects. However, it should be noticed that in reality, behavioral programs for urinary incontinence often need to be given to subjects with diverse types of incontinence, and to be operated by non-physicians. In the respect that the present study conducted the community-based application of combined behavioral intervention provided to the subjects with diverse types of incontinence by nurses, the results can be meaningful and applicable to the variety of clinical setting.

Notably, many of incontinent women participated in the present study had a misunderstanding that urinary incontinence could occur spontaneously after child birth or with aging and was untreatable. For this reason, most subjects accept this uncomfortable situation without any effort to treat. Therefore, it was recognized that accurate

information should be preferentially provided to potential groups for a better understanding of urinary incontinence. In addition, a systematic management for urinary incontinence as one of the postpartum nursing cares should be also performed even to young women.

Further studies will be needed to develop and examine various adherence strategies for long-term effects of the behavioral intervention programs, and to define the factors affect the intervention effects of the programs. In particular, nurses in the area of the women health managements need to obtain accurate information, and improve their skills related to urinary incontinence training.

## CONCLUSION

The results of the present study showed that the program was effective overall in terms of treating symptoms and improving psycho-social well-being related to urinary incontinence. According to the follow-up assessment conducted after a 4-week self-training period, incontinence symptoms and psych-social well-being were also significantly improved. Because the treatment effects of behavioral therapies are highly dependent on continued exercise (Alewijnse et al., 2003), and because the severity of urinary incontinence gradually increases with age, maintenance protocols and strategies to improve the long-term effectiveness of behavioral therapies for urinary incontinence need to be developed.

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