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Quality of life outcomes following 1 year encouragement of pelvic floor muscle exercise among urinary incontinence women living in the community

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ABSTRACT

Background: Urinary incontinence (UI) is a silent problem affecting women's health. This problem causes lower self-confidence to participate in various activities. Pelvic floor muscle exercise (PFE) is the first recommended for treatment of UI. Adherence to PEF is the key to success in maintaining continence. However, no studies have supported the effect of sustaining PFE continually on the symptoms of UI and the quality of life (QoL) in the long term.

Objectives: This study aimed to investigate the effect of the 1-year encouragement of PFE on UI symptoms and the quality of life among incontinence women living in the community.

Materials and methods: Thirty-four women with UI aged between 50-70 years were invited in this study. The women were interviewed for the UI variables including the ability to hold urine, the frequency and amount of UI, feeling urgency to urinate, the frequency of urination during the daytime and nighttime. Additionally, the King's health questionnaire (KHQ- Thai version) was used to measure the quality of life. The UI variables and KHQ were measured at baseline, 3rd, 6th, 9th and 12th months of the intervention. PFE program was provided to participants after baseline measurement and encouraged to perform continually and consistency for 1 year. Descriptive statistics, one-way repeated ANOVA and Friedman test were used to analyze the data.

Results: At the end of program, 24 women (92.3%) had no problems with urinary control. In part of the frequency and the amount of stress UI, all of them were completely improves (100%). In terms of the symptoms associated with urged UI such as the feeling urgency to urinate, most of them had no hustle during urination (80.8%). The frequency of urination was reduced, all of them had less than 5 times urination during the day. The severity of symptoms associated with UI was significantly different compared to baseline. In addition, the KHQ score for all items was lower, indicating a higher QoL when compared to baseline.

Conclusion: Longterm promoting of PFE was effective for the improvement of UI and significantly increased the QoL among incontinence women living in communities.

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Introduction

Urinary incontinence (UI) is defined as involuntary leakage of urine. UI is divided into 3 types: stress urinary incontinence (SUI), urge urinary incontinence (UUI) and mixed urinary incontinence (MUI).[1-3] SUI is involuntary leakage of urine during an effort or physical exertion (e.g. sporting activities), or on sneezing or coughing. SUI is the most common form of UI which is caused by poor urethral support by pelvic floor muscle during an increased abdominal pressure pushes down on the bladder. UUI is the involuntary urine loss associated with sudden and strong desire to urinate. UUI is commonly known as overactive bladder which usually caused by involuntary contractions of the detrusor muscle of the bladder wall at improper times. MUI is the symptoms that include both stress and urge UI. UI is a silent health problem affecting many community-dwelling, especially in women more than men. The prevalence of the UI is estimated that 22-48 % in women and increased with age significantly every year.[4] This problem causes a lower quality of life (QoL) in various aspects such as physical and mental health, hygiene, economy, career, social, family and even sexual relations. Regarding psychosocial health, UI causes stress, depression, annoyance, anxiety, embarrassment, lack of confidence, refusal to participate in various activities outdoor and even withdrawal from social.[5]

Pelvic floor muscle exercise (PFE) is the conservative interventions recommended as the first-line treatment of UI.[6] This type of exercise is very easy and does not take too much time. The exercise consists of fast and slow contraction of pelvic floor muscles 30 times a day. Beginning with rapid and maximal contraction about 5-10 times, followed by squeeze and hold about 5-10 seconds, 5-10 times, with a variety of starting positions (lying, sitting and standing).[7] The effectiveness of the PFE in the management of UI has been shown by several studies.[3, 7-8] Additionally, the systemic reviews had demonstrated that PFE significantly improves QoL.[9] PFE is beneficial in women with SUI. However, PFE sometimes also recommends for UUI and MUI. There was a systematic review indicated that PFE can improve symptoms of SUI and all other types of UI.[10] The Guideline of UI, National Institute for Health and Care Excellence (NICE) and International Continence Society (ICS) recommend that PFE program should be continued for at least 3 months to achieve the improvements.[1, 11] Nevertheless, the improvements are not always sustained over the long term. The effectiveness will lessen with time if there is no continuity of exercise.[12] Poor exercise adherence is the main obstacle in the management of UI. The factor related to reduction in frequency of exercise including not having enough time, forgetting to do exercise and boredom with the exercise.[13] A possible way to maintain continence and quality of life is to sustain the adherence of PFE in everyday life. Venegas et al.[14] indicated that the patient-related factor is the strongest influence on long term adherence to PFE. They suggested that strategies involving reminders to perform the exercise may be useful for long term adherence. The strategies may include personalized written form and progress visits every 3-6 months to encourage and motivate a woman with UI to perform the exercise. It would be helpful to apply this strategy among UI women living in the community. However, there is no studies have supported the effect of sustaining PFE continually on the symptoms of UI and the quality of life for the long term. Therefore, this study aimed to investigate the effect of 1-year encouragement of PFE on UI symptoms and quality of life among incontinence women living in the community.

Materials and methods

Study design and participants

This was a community-based study conducted in the Sri Bua Ban Subdistrict, Lamphun Province, Thailand. Forty women who acknowledged having UI were invited by community health agents to participate in this study by screening with the two standard questions “Do you leak urine during physical activities such as coughing, running or sneezing?” and “Does urine leak when you rush to the toilet? These two questions were used to determine the women's eligibility in this study. The women who reported at least one time of involuntary loss of urine in the last one week were considered having UI. The inclusion criteria include incontinence women aged between 50-70 years who capable of reading, writing and agreed to participate in this study. The exclusion criteria were as follows: women suffering from neurological conditions, pregnant women or presented of the symptoms of urinary tract infection. The participants were withdrawn if they are unable to continue the PFE program (lacking more than 2 times of meeting) or request to stop participating in the program. There were thirty-four participants who met-the inclusion criteria. All participants gave their informed and written consent before the commencement of the study. The study was approved by the research ethics committee for research in humans, Faculty of Associated Medical Science, Chiang Mai University (Project code AMSEC-60EX-016).

Measurements

The outcome measured included the symptoms and severity of UI variables (the ability to hold urine, the leakage of urine while coughing or sneezing, the frequency and the amount of leakage etc.) and the KHQ Thai-version to measure the quality of life. Outcomes were measured at baseline, 3rd, 6th, 9th and 12th months of the intervention. The details of outcomes measurements are described below.

The incontinence urinary variables questionnaire

The participants were interviewed individually regarding the symptoms related to UI. There are seven aspects of questions including the ability to hold urine, the frequency of urine leakage while coughing or sneezing, the urgent feeling to urinate, the frequency and the amount of leakage and the frequency of urination during daytime and nigh time. The question was modified from international consultation on incontinence questionnaire-female lower urinary tract symptoms (ICIQ-FLUTS) Thai-version.[15] The participants were asked to rate the severity of symptoms from zero to four, less number indicating the less severity and the high number indicating severe problem. For example,

the aspect of frequency of leakage, 1= none, 2= once a week or very little, 3= once a day or moderate problem and 4= several times a day or many problems. The detail of other aspects are described in the Table 2.

King's health questionnaire

KHQ is the most commonly used questionnaire for measuring the quality of life that is specific for people with urinary incontinence. This questionnaire was translated to Thai-version with a good reliability.[16] Originally, it is a self-administered questionnaire without needing an interviewer. However, some question is needed to clarify in elderly women especially women in community dwelling. Thus, the procedure for answering in this study performed in conference room and divided into equal groups, with four physical therapists present in each group to explain the question if they need. As well as helping to read the questionnaire in those who cannot see the letters clearly. Therefore, participants answered the questionnaires themselves. KHQ has two parts consisting of twenty-one items and separated in nine domains. Part one considers general health perception and incontinence impact on life. Part two consists with the limitations, relationships, emotion and the incontinence severity. In part of KHQ, each domain is scaled from 0; best to 100; worst. The lower KHQ scores is an indication of a better quality of life.[17]

Pelvic floor muscle exercise program

The intervention program was conducted in the community by a physical therapist with more than 5 years of experience teaching in UI women. After the confirmation about incontinence symptoms, participants were educated about the structure and function of the pelvic floor and the associated factor of the UI. Then, the researcher educated the participants on how to perform a correct pelvic floor muscle contraction by practicing as a group and examining individually. The program consists of the strong and fast contraction of pelvic floor muscles (contract/relax) for 5-10 times and followed by sustained pelvic floor muscle contraction holding for 5-10 seconds. The time holding the contraction of pelvic floor muscle gradually increase depending on each participant. This program was counted as 1 set, making a total of 30 sets per day at least 3-4 days a week.[18]

Participants were asked to fill out in the self-daily report after they do this program. In addition, participants were followed up by monthly phone calls to tracking and encourage the consistency in the training program. Moreover, the researcher organizes a meeting every 3 months during the trial to monitor consistency and adherence to the training program. Including collecting and checking the logbook daily report from participants and receiving new book until reaching 1 year.

Data analysis

Descriptive statistics were used to describe demographic data and UI variables. Friedman and Wilcoxon Signed Ranks Test were used to compare the UI variables from baseline and in 3, 6, 9 and 12 months after treatment. All of the variables of KHQ showed normal distribution. Therefore, one-way repeated measure ANOVA was used to compare the quality of life measured by KHQ scores before (baseline), and at 3rd, 6th, 9th and 12th months after treatment. The level of significance was set at $p<0.05$. The statistical analyses were performed using SPSS for windows version 20.

Results

There were thirty-four women participated in this study. However, at the 3rd months of intervention, there was 1 drop off because of moving to another province. Between the 6th to 9th month we had two participants requested to leave due to illness, one for taking care of the newly born nephew and there were four drop out without answering the phone. Finally, only twenty-six participants finished the program. The mean age of participants was 57.85±4.4. The most prevalent type of UI was SUI (65.4%); followed by MUI (26.9%) and UUI (7.7%). The level of education of all participants is a primary school. Their characteristics of participants are presented in Table 1. The descriptive data for UI variables presented in Table 2. At baseline, 18 of them (69.2%) was answering that they had a little problem in the ability to hold the urine, 5 (19.2%) had a moderate problem and 3 (11.5%) had many problems to control the urine. During the intervention from 3rd to 12th months, the UI variables showed gradually improves. At the end of the program 24 of them (92.3%), found that they had no problems with urinary control and 2 (7.7%) saying that there was only a little problem. In part of the frequency of urine leak while having activity (such as coughing, sneezing), all of them (100%) had no urine leakage while coughing, sneezing and during the general day. In addition, the frequency of UI and the amount of UI during the general day was also completely improved. In terms of the symptoms associated with UUI such as the feeling urgency to urinate results showed that 21 of them (80.8%) had no hustle, 3 (11.5%) had infrequent urgency and 2 (7.7%) had hurry sometimes. The frequency of urination was reducing both during the daytime and nighttime. During the daytime, we found 100% participants had less than 5 times urination during the day considered it as normal status. For the night-time, 11 of them (42.3%) did not have urination, 15 (57.7 %) had once to twice times urination during the nighttime.

The severity of the UI variables was analyzed and presented in Table 3, the results showed that the severity of the UI variables is significant change from 3rd, 6th, 9th and 12th of intervention when compared to baseline. Considering each period, all UI variables significant change after three months of intervention when compared to baseline except the frequency of urination during day-time. For the QoL, all 9 items of the KHQ was found gradually reducing score from 3rd to 12th months. All items of the QoL is significantly different when compared to baseline (p=0.001). In part of personal relationships, emotions, sleep/energy and incontinence severity after the ending of the program, the score is reduced to zero which indicated that a better of QoL (Table 4).

Table 1 Characteristics of participants (n=26).

Data	Mean±SD
Age (years)	57.85±4.4
Weight (kg)	57.42±7.1
Height (cm)	153.35±5.1
BMI (kg/m^2)	24.35±3.2
Type of Urinary incontinence*	
- Stress	17 (65.4%)
- Urge	2 (7.7%)
- Mixed	7 (26.9%)
Mode of delivery*	
- Vaginal	25 (96.2%)
- Cesarean	1 (3.8%)
Number of deliveries*	
- No	1 (3.8%)
- 1 time	7 (26.9%
- 2 times	16 (61.5%)
- 3 times	2 (7.7%)

**Data presents as number (%)*

Table 2 Percentage distribution of participants according to symptoms and severity of urinary incontinence.

Urinary incontinence variables	Number (%)				
	baseline	3 months	6 months	9 months	12 months
The ability to hold urine					
no problem		8 (30.8%)	16 (61.5%)	8 (30.8%)	24 (92.3%)
a little problem	18 (69.2%)	13 (50.0%)	8 (30.8%)	11 (42.3%)	2 (7.7%)
moderate problem	5 (19.2%)	4 (15.4%)	1 (3.8%)	7 (26.9%)	-
many problem	3 (11.5%)	1 (3.8%)	1 (3.8%)	-	-
Stress incontinence while coughing or sneezing					
no problem	2 (7.7%)	2 (7.7%)	5 (19.2%)	8 (30.8%)	26 (100%)
a little problem	8 (30.8%)	13 (50%)	17(65.4%)	13 (50.0%)	-
moderate problem	7 (26.9%)	8 (30.8%)	3 (11.5%)	5 (19.2%)	-
many problem	9 (34.6%)	3 (11.5%)	1 (3.8%)	-	-
Frequency of leakage					
none		7 (26.9%)	14 (53.8%)	12 (46.2%)	26 (100%)
once a week or very little	17 (65.4%)	16 (61.5%)	9 (34.6%)	14 (53.8%)	-
2-3 times a day	4 (15.4%)	-	2 (7.7%)	-	-
several times a day	5 (19.2%)	3 (11.5%)	1 (3.8%)	-	-
The amount of protection use					
none	4 (15.4%)	7 (26.9%)	5 (19.2%)	13 (50.0%)	26 (100%)
permeate underwear	13 (50.0%)	14 (53.8%)	16 (61.5%)	12 (46.2%)	-
change underwear	6 (23.1%)	4 (15.4%)	4 (15.4%)	1 (3.8%)	-
change the pant	3 (11.5%)	1 (3.8%)	1 (3.8%)	-	-

Table 2 Percentage distribution of participants according to symptoms and severity of urinary incontinence. (continues)

Urinary incontinence variables	Number (%)				
	baseline	3 months	6 months	9 months	12 months
Feeling urgency to urinate					
don't hurry		2 (7.7%)	5 (19.2%)	13 (50.0%)	21 (80.8%)
infrequency		7 (26.9%)	14 (53.8%)	8 (30.8%)	3 (11.5%)
sometimes	9 (34.6%)	11 (42.3%)	6 (233.1%)	4 (15.4%)	2 (7.7%)
every time	17 (65.4%)	6 (23.1%)	1 (3.8%)	1 (3.8%)	-
Frequency of urination during daytime					
less than 5 times	19 (73.1%)	22 (84.6%)	25 (96.2%)	26 (100%)	26 (100%)
5-6 times per day	6 (23.1%)	4 (15.4%)	1 (3.8%)	-	-
6-7 times per day	1 (3.8%)	-	-	-	-
every hour per day	-	-	-	-	-
Frequency of urination at night					
none	5 (19.2%)	5 (19.2%)	5 (19.2%)	8 (30.8%)	11 (42.3%)
1-2 time	6 (23.1%)	17 (65.4%)	18 (69.2%)	11 (42.3%)	15 (57.7%)
3-4 times	9 (34.6%)	4 (15.4%)	3 (11.5%)	7 (26.9%)	-
More than 4	6 (23.1%)	-	-	-	-

Table 3 Comparison of the severity of symptoms associated with urinary incontinence before and after intervention.

Urinary incontinence variables	baseline	3 months	6 months	9 months	12 months	*p* value
The ability to hold urine	2.42 ± 0.70	1.92 ± 0.80 [a]	1.50 ± 0.76 [a,b]	1.96 ± 0.77 [a,c]	1.08 ± 0.27 [a,b,c,d]	0.001
The leakage of urine while coughing or sneezing	2.88 ± 1.00	2.46 ± 0.81[a]	2.00 ± 0.69 [a.b]	1.88 ± 0.71 [a,b]	1.00 ± 0.00 [a,b,c,d]	0.001
Frequency of leakage	2.46 ± 0.91	1.96 ± 0.87 [a]	1.2 ± 0.80 [a,b]	1.54 ± 0.51 [a,b]	1.00 ± 0.00 [a,b,c,d]	0.001
The amount of leakage	2.31 ± 0.88	1.96 ± 0.77 [a]	2.04 ± 0.72	1.54 ± 0.58 [a,b,c]	1.00 ± 0.00 [a,b,c,d]	0.001
Feeling urgency to urinate	3.65 ± 0.50	2.81 ± 0.90 [a]	2.12 ± 0.80 [a,b]	1.73 ± 0.90 [a,b]	1.31 ± 0.62 [a,b,c,d]	0.001
Frequency of urination during daytime	1.31 ± 0.55	1.15 ± 0.37	1.04 ± 0.20 [a]	1.00 ± 0.00 [a,b]	1.00 ± 0.00 [a,b]	0.001
Frequency of urination at night	2.62 ± 1.06	1.96 ± 0.60 [a]	1.92 ± 0.56 [a]	1.96 ± 0.77 [a]	1.58 ± 0.50 [a,b,c,d]	0.001

[a]Statistically significant differences when compared with baseline (p<0.05), [b]Statistically significant differences when compared with 3 months (p<0.05), [c]Statistically significant differences when compared with 6 months (p<0.05), [d]Statistically significant differences when compared with 9 months (p<0.05).

Table 4 Comparison of the KHQ score before and after intervention.

KHQ domains	baseline	3 months	6 months	9 months	12 months	*p* value
General health perceptions	41.35±12.13	33.62±14.04 [a]	22.12±14.71[a,b]	18.27±15.10 [a,b]	7.69±11.77 [a,b,c,d]	0.001
Impact on life	76.93±15.69	55.13±26.57 [a]	25.64±28.76 [a,b]	15.38±23.53 [a,b,c]	7.69±14.32 [a,b,c]	0.001
Role limitations	66.67±18.26	37.82±30.75 [a]	18.59±26.38 [a,b]	6.41±12.54 [a,b,c]	6.41±11.62 [a,b,c]	0.001
Physical limitations	69.23±11.25	33.33±30.91[a]	14.74±26.39 [a,b]	3.85±7.16 [a,b,c]	3.85±7.16 [a,b,c]	0.001
Social limitations	48.72±17.52	26.07±23.72 [a]	12.39±22.73 [a,b]	2.14±6.30 [a,b,c]	0.00±0.00 [a,b,c]	0.001
Personal relationship	17.31±28.47	6.41±15.69 [a]	3.85±9.78 [a]	0.00±0.00 [a,b,c]	0.00±0.00 [a,b,c]	0.001
Emotions	32.48±15.37	18.80±18.80 [a]	6.84±10.92 [a,b]	3.85±6.99 [a,b]	0.00±0.00 [a,b,c,d]	0.001
Sleep/energy	35.90±19.83	21.80±21.48 [a]	10.26±16.38 [a,b]	5.13±10.29 [a,b]	0.00±0.00 [a,b,c,d]	0.001
Incontinence severity	32.05±17.90	19.23±16.63 [a]	13.78±15.63 [a,b]	8.97±10.78 [a,b,c]	0.00±0.00 [a,b,c,d]	0.001

[a]Statistically significant differences when compared with baseline (p<0.05), [b]Statistically significant differences when compared with 3 months (p<0.05), [c]Statistically significant differences when compared with 6 months (p<0.05), [d]Statistically significant differences when compared with 9 months (p<0.05.

Discussion

UI is a common problem found in women, especially in middle-aged and elderly women. This problem is affecting both physical and psychological health. This is a silent problem that has less help-seeking behavior and tended to delay treatment particularly in an urban community.[19] Therefore, healthcare providers should be targeted for health education and intervention regarding this problem. The PFE is the first choice recommended as means of preventing and treating UI.[1, 3, 6] Systemic reviews have addressed the positive effect of PFE on the QoL of women with UI.[9] The underlying mechanism of PFE is an increase in muscle strength and endurance of pelvic floor muscle which is urethral support. The result of this study is consistent with previous studies that an improvement in UI symptoms occur after continuously PFEs for 3 months.[20-24] In addition, PFE not only decreased the UI symptoms but also significantly improves the QoL of women with UI.[9] PFE is a non-invasive treatment that provides an effective treatment as combined with or without another treatment method such as combined with vaginal cone,[25] Bladder training[22] and pessary therapy.[26] Moreover, this exercise can performed with various training positions without affecting performance.[7] PFE is very simple and suitable to educate in UI women living in the community. This study demonstrated the effectiveness of PFE throughout 1-year encouragement emphasized on the patient-related factor include the personalized self-daily report, phone calls every month, progress visits every 3 months and remind to perform the exercise via sticker note. This strategy is very useful for long term adherence. This study found that PFE causes improve UI symptoms and QoL after 3 months and throughout the program. Additionally, the present study found that between the 6th to the 9th month after starting the program, showing relatively stable results or a tendency to worsen compared to the previous period such as the ability to control urine and QoL but when compared to the baseline, all clinically relevant in symptoms and condition related to QoL were report the good improvement. An explanation for these results may be the exercise consistency was reduced, this finding related to the self-daily report which found during the 6th to the 9th month most of the participants decreased their exercise frequency. Six months after starting the interventions is the focus point for promoting and encouraging the exercise. In this study, a professional physical therapist provided the program with intensive exercise tracking. Including calling every month and provide meetings every 3 months for 1 year to encourage, stimulate and maintain exercise consistency.

Actually, PFE is commonly recommended for SUI. According to the present study, 100 % of participants had no urine leakage while coughing, sneezing and during the general day at the end of the program. PFE used to strengthen the pelvic floor muscle and enhances the function of urethral sphincter. A research showed that PFE result in hypertrophy of the urethral sphincter and reduces bladder neck motion during coughing.[27] However, PFE sometimes also recommends for UUI and MUI.[10] The-long term of PFE in this study demonstrated the reduction of urinary frequency during the day and night time. Hersh and Salzman[28] explained that voluntary contraction of pelvic floor and relaxation reduces the incontinence by producing urethral closure and decreasing the stimulation of the central nervous system to the detrusor muscle and thus reduces the UUI. However, the cause of UI especially UUI are multifactorial, and the success of treatment might include lifestyle modification such as appropriate fluid intake, reduction of caffeine or weight loss if a patient is overweight or obese.[29] The most important key success is the exercise compliance with treatment because the pelvic floor muscle strength depends heavily on continuous training.

Besides, the QoL measured by KHQ showed a significant difference in all domains compared to baseline. Five domains showed decreasing values to zero at ending the training program which indicates a very good quality of life. This present study supports that PFE improves the quality of life as reported by other studies.[30-31] Although UI is not a life-threatening condition, it is related to restriction in personal and social life. Improvement of UI symptoms significant impact on QoL by increase self-confidence and promote social gathering which has impact on their social interaction. The decrease of urinary frequency and feeling urgency especially during the nighttime might has a positive on the quality of sleep[32] and decrease on the risk of falls, which may lead to fractures and other morbidities in the elderly.[33]

This study focuses intensively on encouraging, stimulating and following participants. Creating the motivation, adjust attitudes, and reach out to volunteers to listen, talk, and adjust individual treatment plans that do not affect work and their daily life to maintain adherence to the treatment. It would be helpful for the healthcare providers to recommend this methodology to women with UI to resolve the problem. Limitation of this study include there are a small number of participants due to request to leave and loss of follow up. Moreover, there was no control group in this study. Further study should add a control group to help strengthen the research. Although, the UI variables were modified from ICIQ-FLUTS Thai-version questionnaire, but some variables were added to clarify and cover the severity of symptoms. This questionnaire need to be validated for further study.

Conclusion

This study showed that continuous PFE is an effective treatment of UI and significantly increases the QoL among incontinence women living in communities. The motivation and encouragement on patient-related factors was effective for the improvement of UI and significantly increased QoL among incontinence women living in communities.

Conflict of interest

The authors declare that they have no conflict of interest.

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