ORIGINAL ARTICLE

Exercise Adherence to Pelvic Floor Muscle Strengthening Is Not a Significant Predictor of Symptom Reduction for Women With Urinary Incontinence

Hsiu-Chuan Hung, PT, PhD, Shu-Yun Chih, PT, MS, Ho-Hsiung Lin, MD, PhD, Jau-Yih Tsauo, PT, PhD

ABSTRACT. Hung H-C, Chih S-Y, Lin H-H, Tsauo J-Y. Exercise adherence to pelvic floor muscle strengthening is not a significant predictor of symptom reduction for women with urinary incontinence. Arch Phys Med Rehabil 2012;93:1795-1800.

Objective: To explore the predictors of treatment effectiveness for women with urinary incontinence (UI) receiving pelvic floor muscle (PFM) strengthening.

Design: Four-month cohort study.

Setting: Laboratory.

Participants: Volunteers (N=68; mean age ± SD, 50.5±6.0y) with UI.

Intervention: Four-month daily PFM strengthening exercise program at home.

Main Outcome Measures: Outcome measures included self-reported improvement, Severity Index score, 3-days diary, strength of PFM, and quality of life. The participants' recall of the amount of exercise after the 4-month exercise period was used to assess the exercise adherence.

Results: Fifty-one (75%) of 68 women reported that their condition improved after 4 months of exercise. There were significant reductions in Severity Index score, number of voidings per day, number of leakages per day, and impact on quality of life ($P<.05$). In addition, the score of PFM strength was significantly improved ($P=.001$). There were no significant correlations between the change score of the Severity Index and age, body mass index, parity, type of UI, duration of UI, menopausal status, and amount of exercise (all $P>.10$). Multiple regression analysis revealed that initial severity of symptoms and improvement of PFM strength predicted 51.3% of variance in 4-month exercise effectiveness (change score of the Severity Index).

Conclusions: The effectiveness of the 4-month PFM strengthening program was influenced by the severity of symptoms and the improvement score of PFM strength instead of exercise adherence. Women who had more significant symptoms of leakage (higher score on the Severity Index at baseline) and who had more improvement of PFM strength showed more improvement of symptoms after PFM strengthening.

Key Words: Exercise; Pelvic floor; Rehabilitation; Urinary incontinence.

URINARY INCONTINENCE (UI), defined as "complaint of involuntary loss of urine,"[1(p5)] is more common in women than in men across the lifespan.[2] Prevalence of UI in women varied from 4.8% to 58.4% in the world and increased markedly in a longitudinal population-based survey in the recent decade.[2,3] Women suffering from UI engaged in fewer activities that involved physical or social efforts and had impaired quality of life in multidimensions.[2,4,5]

Pelvic floor muscle training (PFMT) has been widely used to treat UI since Kegel[6] introduced this kind of exercise. The effectiveness of PFMT has been demonstrated by numerous randomized controlled trials, according to a Cochrane review.[7] High-quality randomized controlled trials showed the immediate cure rates (defined as <2g leakage during the pad test) after PFMT from 44% to 70%.[8-10] It has been recommended as one of the first-line conservative managements for women with stress urinary incontinence (SUI), mixed urinary incontinence (MUI), and an overactive bladder with or without urgency UI.[7,11]

Adherence was supposed to be an important factor of treatment effectiveness. Several studies revealed that the effectiveness of PFMT was higher with a treatment program under supervision than with an unsupervised program,[12-14] whereas Felicissimo et al[15] could not demonstrate the difference between supervised training and unsupervised home exercises. However, the supervised and unsupervised conditions could not indicate the exercise adherence. Thus far, no direct evidence has demonstrated that exercise adherence is a significant predictor of pelvic floor muscle (PFM) exercise effectiveness for symptomatic women. Whether any other factors interact with adherence to influence the exercise effectiveness is also unknown.

Therefore, we designed a 4-month prospective cohort study to explore the predictors of treatment effectiveness for women with SUI and MUI receiving PFM strengthening. We hypoth-

List of Abbreviations

BMI	body mass index
MUI	mixed urinary incontinence
PFM	pelvic floor muscle
PFMT	pelvic floor muscle training
SUI	stress urinary incontinence
UI	urinary incontinence

From the School and Graduate Institute of Physical Therapy, College of Medicine, National Taiwan University, Taipei (Hung, Chih, Tsauo); Department of Rehabilitation Science, Jen-The Junior College of Medicine, Nursing and Management, Miaoli (Hung); and Department of Obstetrics and Gynecology, College of Medicine, National Taiwan University and National Taiwan University Hospital, Taipei (Lin), Taiwan.

Presented at the World Confederation for Physical Therapy Congress, June 20-23, 2011, Amsterdam, The Netherlands.

Supported by the National Science Council of the Republic of China (grant no. NSC95-2314-B002-226-MY2).

No commercial party having a direct financial interest in the results of the research supporting this article has or will confer a benefit on the authors or on any organization with which the authors are associated.

Clinical Registration Trial No.: NCT00270738

Correspondence to Jau-Yih Tsauo, PT, PhD, Floor 3, No 17, Xuzhou Rd, Zhongzheng District, Taipei City 100, Taiwan (R.O.C.), e-mail: *jytsauo@ntu.edu.tw*. Reprints are not available from the author.

In-press corrected proof published online on May 8, 2012, at www.archives-pmr.org.

0003-9993/12/9310-01087$36.00/0
http://dx.doi.org/10.1016/j.apmr.2012.03.010

esized that exercise adherence is a significant predictor of treatment effectiveness.

METHODS

Design and Setting

This was a prospective cohort study. All participants received a 4-month home exercise program after the first evaluation and received a second evaluation after 4 months of participation. This study was conducted at a Life Quality and Health Promotion Laboratory in the National Taiwan University. The Research Ethics Committee of National Taiwan University Hospital approved the study. Sixty-eight volunteers provided their written informed consent to participate.

Participants

Women volunteers were recruited through a newspaper advertisement. Women were eligible if they were aged 18 to 65 years and had at least 1 episode of SUI symptom during the previous month. Two standardized questions about UI used to determine the eligibility were the following: "During the past month, have you involuntarily been wetting yourself in connection with physical exertion, for example, coughing, lifting, sneezing, or laughing?" and "During the past month, have you experienced such a strong urge to pass water that it was impossible to get to the toilet in time?"[16(p970)] Women who answered yes to the first question only and women who answered yes to both questions were categorized as SUI and MUI, respectively, and were recruited. Women who answered yes to the second question only were categorized as urge UI and were excluded.[16] Exclusion criteria included being pregnant or less than 3 months postpartum, having systemic neuromuscular disease, having had previous surgery or intensive PFMT for UI, having severe low back pain or pelvic pain, having undergone concurrent treatment for UI, having had a radical hysterectomy, or having ongoing urinary tract infections.

Intervention

All participants received 1 training session only. Individual instruction in the anatomy of the pelvic floor, the lower urinary tract, and the continence mechanism were provided by a physical therapist (S.-Y.C.). Advice about bladder hygiene was also given. They were also taught how to contract the PFM correctly by vaginal palpation before the home exercise period. A daily strengthening exercise program was prescribed for 4 months. Participants were asked to conduct at least 3 sets of 6 high-intensity (near-maximum) contractions daily at home, with the aim of holding each muscle contraction for 10 seconds at maximum, with at least a 10-second rest between contractions.

Measurements

The primary outcome measure was self-reported improvement. A 4-point Likert scale (worse, unchanged, improved, cured) was used to assess self-reported improvement at the second evaluation.[17-19] In addition, the percentage of improvement (range, 0%–100%) was also recorded, except for the women who reported a worse condition. Zero percent and 100% represented unchanged and cured, respectively.

Other assessments performed at both first and second evaluations consisted of the Severity Index score,[20] a 3-day voiding diary,[21] PFM strength,[22] and quality of life.[23,24] The Severity Index score (range, 1–12) was a value found by multiplication of frequency (4 levels) and amount of leakage (3 levels).[20] A higher Severity Index score represented the more severe incontinence. The 3-day voiding diary was recorded at home. Participants were asked to record every event of voiding, urgency, and urinary leak and describe the condition of leakage. The mean numbers of voidings and leaks per day were calculated for analysis.[21] The PFM strength was assessed via digital vaginal palpation by the physical therapist (S.-Y.C.) with the participant lying in a bent-knee position. PFM strength was scored according to the Modified Oxford Scale and a 6-point Likert scale from 0 to 5, including zero, flicker, weak, moderate, good, and strong.[22] A higher score represented stronger PFMs. Participants were asked to contract PFMs maximally, as fast as possible. Palpation and visual observation was used to monitor activity of the abdominal and hip muscles. The impact of incontinence on health-related quality of life was assessed by the Symptom Impact Index, Chinese version.[23,24]

Exercise Adherence

The participants' recall of the amount of exercise after the 4-month exercise period was used to assess the exercise adherence. At the end of the 4-month intervention, they were asked about the exercise frequency: contractions per set, sets per day, and days per week (6 contractions $\times$ 3 sets $\times$ 7d $\times$ 16wk = 2016 contractions). Eighteen contractions every day for 4 months were expected. A percentage of exercise adherence was calculated for each participant using the following formula: (number of contractions performed/expected number of contractions) $\times$ 100%. Exercise adherence was categorized to 3 levels, including high (>80%), moderate (20%–80%), and low (<20%) adherence.[25]

Statistical Analysis

Descriptive analysis was used to describe the basic characteristics and outcome variables. Only age was normally distributed and presented as mean $\pm$ SD. The other continuous variables and ordinal variables were presented by the median and 25th and 75th percentiles. Number and percentage were reported for categorical variables. The Wilcoxon signed-rank test was used to detect possible change to assess the treatment effects.

For the detection of potential factors that may have influenced the treatment effect, we used the change score of the Severity Index ($\text{Severity Index}_{pre} - \text{Severity Index}_{post}$) to be the dependent variable. Predictor variables included age, body mass index (BMI), parity, type of UI, duration of UI, menopausal status, PFM strength at baseline, change of PFM strength ($\text{strength score}_{post} - \text{strength score}_{pre}$), Severity Index at baseline, amount of exercise, and exercise adherence. The higher change scores of the Severity Index and PFM strength represented more improvement of UI and PFM strength, respectively. Spearman correlations between dependent and predicting variables were assessed first to detect the significant factors. According to Portney and Watkins,[26] a correlation coefficient of .25 or less represents a poor relationship; .25 to .50 represents a fair relationship; .50 to .75 represents a moderate to good relationship; and .75 or more represents a good to excellent relationship.

Stepwise multiple linear regression analysis was conducted to further examine the contribution of significant predictors. Dependent variable in this regression analysis was defined as the change scores of the Severity Index. For all statistical testing, 2-tailed P values <.05 were considered significant. Statistical analysis was completed using SPSS for Windows, version 11.0.[a]