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Effect of a 12-Week Pilates Pelvic Floor-Strengthening Program on Short-Term Measures of Stress Urinary Incontinence in Women: A Pilot Study

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Stress urinary incontinence (SUI) is the common condition of involuntary urine leakage that occurs when intra-abdominal pressure suddenly increases (e.g., coughing, sneezing, lifting, running). The primary causes of SUI are pregnancy and childbirth, which decrease pelvic muscle tone, but other risk factors are hysterectomy, obesity, menopause, or nerve damage attributable to surgery.[1] SUI negatively affects a woman's quality of life and can lead to embarrassment, social withdrawal, and diminished activity.[2]

The clinical standard of care for SUI is pelvic floor muscle training (PFMT), which can positively affect women with mild-to-moderate SUI symptoms.[3] Although PFMT is effective, long-term adherence to training is uncommon. Subsequently, the sustained benefits of PFMT can be negligible, and SUI can become a long-term condition.[4]

Pilates exercises improve core and pelvic floor strength[5] and may be executed with breath work. During exhalation, the transversus abdominis and pelvic floor contract, whereas during inhalation, the diaphragm contracts and the pelvic floor lengthens. These synergistic muscles protect and support the lumbopelvic and urogenital structures and their function.[6]

Pilates classes have become widely accessible and are relatively inexpensive. Commonly instructed as a group class, Pilates promotes social connectedness and accountability, which can facilitate exercise adherence.[7]

Our research objectives were to (1) ascertain the feasibility of a Pilates program (twice weekly, 12 weeks) that emphasized pelvic floor strengthening and (2) determine whether it improved self-reported measures of SUI in women of age 45–70 years. We posited that a community intervention for women with SUI could serve as an affordable accessible complement to clinical care and support long-term sustainable management of SUI.

The primary objective of our single-arm noncontrolled pilot study was to assess the effect of this program by using patient-reported International Consultation on Incontinence Short Form (ICIQ-SF) scores. Secondary outcomes were scores from the Linear Analogue Self-Assessment (LASA) and Medical, Epidemiological, Social Aging (MESA) questionnaires, and the duration of continued exercises after the intervention.

The study was approved by the Mayo Clinic Institutional Review Board. Participants were eligible for the study if they had a score of 6+ on the ICIQ-SF, could transition independently to and from the floor, were able to attend 75% of classes, and could provide informed consent. Exclusion criteria were pregnancy, impaired bladder function due to a neurologic condition, or inability to comprehend English. The Pilates mat intervention was developed through a collaboration among Pilates instructors and women's health physical therapists.

Twenty-six participants provided informed consent and met individually with a women's health physical therapist to review pelvic floor anatomy and function. Eighteen participants completed the 12-week Pilates mat intervention and received a handout describing the pelvic floor exercises. They were encouraged to perform the exercises twice weekly.

Participants completed outcome measure surveys at baseline, postintervention, and 6 months after baseline (Table 1). At the 6-month follow-up, they evaluated the overall experience and noted whether they had continued with the Pilates exercises. We observed a significant decrease in ICIQ-SF and MESA SUI scores at both time points after the intervention. Adherence to the Pilates exercises during and after the intervention was high.

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Table 1. Outcomes for Participants Who Completed the Study

Variable[a]	*Baseline* (n = *18*)	*12 Weeks*				*6 Months*			
		Score	*Difference in score from baseline*	*T statistic*	p	*Score*	*Difference in score from baseline*	*T statistic*	p
International Consultation on Incontinence Short Form									
Total score (0–21)				$t(17) = -5.90$	≤0.001			$t(14) = -6.79$	≤0.001
Mean (SD)	10.83 (3.11)	6.28 (3.46)	−4.56 (3.28)			6.93 (3.80)	−4.53 (2.59)		
Range	6–15	3–16	…			0–14	…		
95% CI		…	−6.18 to −2.93			…	−5.97 to −3.10		
No. of respondents		18				15			
How often do you leak urine? (0–5)				$t(17) = -4.68$	≤0.001			$t(14) = -3.59$	0.01
Mean (SD)	3.72 (0.96)	2.72 (1.18)	−1.00 (0.91)			3.00 (1.25)	−0.80 (0.86)		
Range	2–5	2–5	…			1–5	…		
95% CI		…	−1.45 to −0.55			…	−1.28 to −0.32		
No. of respondents		18				15			
How much urine do you usually leak? (0–6)				$t(17) = -2.56$	0.02			$t(14) = -3.06$	0.01
Mean (SD)	2.33 (0.49)	2.06 (0.24)	−0.28 (0.46)			2.00 (0.38)	−0.40 (0.51)		
Range	2–3	2–3	…			1–3	…		
95% CI		…	−0.51 to −0.05			…	−0.68 to −0.12		
No. of respondents		18				15			
Overall, how much does leaking urine interfere with your everyday life? (0–10)				$t(17) = -5.80$	≤0.001			$t(13) = -5.64$	≤0.001
Mean (SD)	5.44 (2.09)	2.44 (2.31)	−3.00 (2.20)			3.14 (2.35)	−2.79 (1.85)		
Range	2–8	0–8	…			0–7	…		
95% CI		…	−4.09 to −1.91			…	−3.85 to −1.71		
No. of respondents		18				14			
Medical, Epidemiological, Social Aging									
Urge incontinence score (0–18)				$t(17) = -2.36$	0.03			$t(14) = 0.48$	0.64
Mean (SD)	4.61 (2.66)	3.06 (3.26)	−1.56 (2.79)			5.13 (3.78)	0.40 (3.22)		
Range	1–10	0–13	…			0–13	…		
95% CI		…	−2.94 to −0.17			…	−1.39 to 2.19		
No. of respondents		18				15			
Stress incontinence score (0–27)				$t(17) = -5.69$	<0.001			$t(14) = -2.25$	0.04
Mean (SD)	13.00 (2.66)	7.28 (3.64)	−5.72 (4.27)			10.73 (4.46)	−2.40 (4.14)		
Range	10–19	2–16	…			3–19	…		
95% CI		…	−7.84 to −3.60			…	−4.69 to −0.11		
No. of respondents		18				15			
Linear Analogue Self-Assessment									
In the past week, how would you describe your overall quality of life? (0–10)				$t(17) = 1.22$	0.24			$t(15) = -0.49$	0.63
Mean (SD)	8.17 (1.29)	8.61 (1.29)	0.44 (1.54)			8.00 (1.46)	−0.19 (1.52)		
Range	5–10	4–10	…			4–10	…		
95% CI		…	−0.32 to 1.21			…	−0.99 to 0.62		
No. of respondents		18				16			

(*continued*)

TABLE 1. (CONTINUED)

Variable[a]	*Baseline* (n = *18*)	*12 Weeks*				*6 Months*			
		Score	*Difference in score from baseline*	*T statistic*	p	*Score*	*Difference in score from baseline*	*T statistic*	p
In the past week, how would you describe your overall physical well-being? (0–10)				$t(16) = 1.41$	0.18			$t(14) = 0.00$	>0.99
Mean (SD)	7.06 (1.75)	7.50 (1.34)	0.47 (1.37)			7.25 (1.88)	0 (2.14)		
Range	3–9	4–9	…			3–9	…		
95% CI		…	−0.24 to 1.18			…	−1.18 to 1.18		
No. of respondents		17				15			
In the past week, how would you describe your overall emotional well-being? (0–10)				$t(17) = -0.40$	0.70			$t(15) = -3.58$	0.003
Mean (SD)	8.11 (1.41)	8.00 (1.46)	−0.11 (1.18)			7.06 (1.88)	−1.13 (1.26)		
Range	5–10	4–10	…			4–10	…		
95% CI		…	−0.70 to 0.48			…	−1.80 to −0.45		
No. of respondents		18				16			
In the past week, how would you describe your overall social well-being? (0–10)				$t(17) = 1.77$	0.10			$t(15) = -0.97$	0.35
Mean (SD)	7.33 (1.75)	7.83 (1.50)	0.50 (1.20)			7.06 (1.57)	−0.38 (1.54)		
Range	4–10	4–10	…			4–9	…		
95% CI		…	−0.10 to 1.10			…	−1.20 to 0.45		
No. of respondents		18				16			

[a]For each questionnaire, the range of possible scores is shown parenthetically. Higher scores indicate improved quality-of-life measures.
CI, confidence interval; SD, standard deviation.

Our data indicate that a community-based Pilates pelvic floor program could be an effective and sustainable method that decreases SUI. Adherence to the home exercise program was reported and reduced SUI was sustained 6 months after baseline. The outcomes for accessibility, attendance, SUI, and adherence affirm the feasibility and effectiveness of this community-based protocol. Replication of this protocol should be tested in a larger randomized controlled study. Considerations for a future study could include pelvic floor anatomy education within the class intervention, different frequencies of classes (once vs. twice weekly), and exclusion of the physical therapist session to reduce the time and cost burden. Tracking other factors that affect SUI (diet, medications, body mass index, etc.) could prove insightful.

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References

1. National Association for Continence. Female stress urinary incontinence. 2017. Online document at: https://www.nafc.org/female-stress-incontinence accessed October 11, 2018.
2. Kwon BE, Kim GY, Son YJ, et al. Quality of life of women with urinary incontinence: A systematic literature review. Int Neurourol J 2010;14:133–138.
3. Paiva LL, Ferla L, Darski C, et al. Pelvic floor muscle training in groups versus individual or home treatment of women with urinary incontinence: Systematic review and meta-analysis. Int Urogynecol J 2017;28:351–359.
4. Bo K, Kvarstein B, Nygaard I. Lower urinary tract symptoms and pelvic floor muscle exercise adherence after 15 years. Obstet Gynecol 2005;105(5 Pt 1):999–1005.
5. Torelli L, de Jarmy Di Bella ZI, Rodrigues CA, et al. Effectiveness of adding voluntary pelvic floor muscle contraction to a Pilates exercise program: An assessor-masked randomized controlled trial. Int Urogynecol J 2016;27:1743–1752.
6. Richardson C, Hides J, Hodges PW. Therapeutic Exercise for Lumbopelvic Stabilisation: A Motor Control Approach for the Treatment and Prevention of Low Back Pain. Edinburgh: Churchill Livingstone, 2004.
7. Burke SM, Carron AV, Eys MA, et al. Group versus individual approach? A meta-analysis of the effectiveness of interventions to promote physical activity. J Sport Exerc Psychol 2006;2:19–35.

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