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A group-based yoga therapy intervention for urinary incontinence in women: a pilot randomized trial.

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## AUGS CONFERENCE SUBMISSION

# A Group-Based Yoga Therapy Intervention for Urinary Incontinence in Women: A Pilot Randomized Trial

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**Objective:** The aim of this study is to examine the feasibility, efficacy, and safety of a group-based yoga therapy intervention for middle-aged and older women with urinary incontinence.

**Methods:** We conducted a pilot randomized trial of ambulatory women aged 40 years and older with stress, urgency, or mixed-type incontinence. Women were randomized to a 6-week yoga therapy program (n = 10) consisting of twice weekly group classes and once weekly home practice or a wait-list control group (n = 9). All participants also received written pamphlets about standard behavioral self-management strategies for incontinence. Changes in incontinence were assessed with 7-day voiding diaries.

**Results:** The mean (SD) age was 61.4 (8.2) years, and the mean baseline frequency of incontinence was 2.5 (1.3) episodes/d. After 6 weeks, the total incontinence frequency decreased by 70% (1.8 [0.9] fewer episodes/d) in the yoga therapy versus 13% (0.3 [1.7] fewer episodes/d) in the control group ( $P = 0.049$ ). Participants in the yoga therapy group also reported an average of 71% decrease in stress incontinence frequency (0.7 [0.8] fewer episodes/d) compared with a 25% increase in controls (0.2 [1.1] more episodes/d) ( $P = 0.039$ ). No significant differences in reduction in urgency incontinence were detected between the yoga therapy versus control groups (1.0 [1.0] versus 0.5 [0.5] fewer episodes/d;  $P = 0.20$ ). All women starting the yoga therapy program completed at least 90% of the group classes and practice sessions. Two participants in each group reported adverse events unrelated to the intervention.

**Conclusions:** Findings provide preliminary evidence to support the feasibility, efficacy, and safety of a group-based yoga therapy intervention to improve urinary incontinence in women.

**Key Words:** urinary incontinence, yoga, urinary stress incontinence, urge incontinence, pelvic floor disorders

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Nearly one third of women aged 40 years and older experience urinary incontinence,<sup>1,2</sup> a condition associated with depression, social isolation, physical inactivity, falls and fractures, and institutionalization.<sup>3–6</sup> Although a variety of clinical therapies for incontinence are available, many have limitations that decrease their efficacy, safety, and/or accessibility, particularly for older women who are at greatest risk of developing incontinence. Behavioral treatment strategies such as pelvic floor muscle exercises and bladder training can be highly effective in treating incontinence but can be difficult for some women to learn without individualized in-person instruction.<sup>7–13</sup> Anticholinergic medications are moderately effective in reducing urgency-type incontinence but are associated with bothersome adverse effects, resulting in high rates of discontinuation.<sup>12–14</sup> For stress-type incontinence, surgery is an effective second-line treatment, but many women do not desire or are not candidates for surgical intervention.<sup>15</sup> Given these limitations, there is a need for treatment alternatives that are not only effective but also accessible and well tolerated by the large number of incontinent women in the community.

One complementary behavioral intervention that may offer therapeutic benefits for urinary incontinence is yoga. As a set of physical and mental practices designed to promote overall health and well-being, yoga has been incorporated into behavioral treatment programs for a variety of chronic health conditions including low back pain, cancer-related symptoms, and hypertension,<sup>16–21</sup> and it has the specific potential to improve incontinence through several mechanisms. By promoting awareness and control over individual muscle groups through the practice of specific yoga postures, yoga can be used to help women identify and strengthen their pelvic floor muscles without traditional pelvic floor rehabilitation. With its focus on deep breathing and mindful meditation, yoga can also be useful in reducing anxiety, perceived stress, and associated autonomic nervous system imbalance,<sup>22–28</sup> which have been identified as risk factors for urgency incontinence in multiple clinical and epidemiologic studies.<sup>29–31</sup> In addition, regular practice of yoga postures can improve and maintain general lower extremity muscle strength, balance, and conditioning,<sup>32,33</sup> which have been shown to protect against incontinence in older women.<sup>34,35</sup> In contrast to most clinical incontinence therapies, yoga can be practiced by women without continuous or ongoing supervision by health care practitioners, thus offering a potentially accessible and cost-effective self-management strategy for a large number of women in the community.

To explore the feasibility, safety, and efficacy of yoga as a behavioral treatment of incontinence, we conducted a pilot interventional trial of a 6-week group-based yoga therapy program in ambulatory middle-aged and older women. Our goals were to determine whether women with clinically frequent incontinence can be safely taught to practice yoga to improve their symptoms and to gather preliminary data on the effects of this yoga therapy intervention on incontinence frequency, bothersomeness, and impact on quality of life.

## MATERIALS AND METHODS

### Participants

Participants were recruited from the San Francisco Bay area from August 2012 to October 2012, using a combination of newspaper advertisements, flyers posted in local community centers and businesses, and direct recruitment from clinician offices. To be eligible, women had to be at least aged 40 years, report experiencing incontinence for at least 3 months, and document at least 7 episodes of incontinence on a screening 7-day voiding diary,<sup>36,37</sup> with at least half of those episodes being stress-type or urgency-type incontinence. Women were excluded if they had severe mobility limitations that would prevent them from participating in a yoga therapy program (inability to walk up a single flight of stairs or at least 2 city blocks on level ground or an inability to stand up from a supine position unaided within 10 seconds) or if they reported formal yoga instruction within the past year or any prior use of yoga specifically to treat incontinence.

Other exclusion criteria included pregnancy within the past 6 months; current urinary tract infection or hematuria (assessed by urine dipstick testing) or history of 3 or more urinary tract infections in the past year; major neurologic condition such as stroke, multiple sclerosis, or Parkinson disease; history of congenital defect leading to incontinence, fistula in the bladder or rectum, pelvic cancer or radiation, or interstitial cystitis or chronic pelvic pain; current symptomatic pelvic organ prolapse; body mass index greater than 35 kg/m<sup>2</sup>; or prior surgery to the urinary tract. Participants also could not have used practitioner-supervised behavioral, pharmacological, or other clinical treatments (eg, pessary) for incontinence within the past 3 months or be planning to initiate new clinical incontinence treatments during the study. All women provided informed consent before enrollment.

### Randomization and Blinding

Eligible participants were randomly assigned by a computer in a 1:1 ratio to participate in a 6-week group-based yoga therapy program (yoga therapy group) or receive no yoga instruction for 6 weeks followed by a gift certificate for local yoga studio classes (control group). Randomization was stratified by incontinence type (stress or stress-predominant vs urgency or urgency-predominant). Participants were aware of their group assignment, but outcomes data from voiding diaries and questionnaires were abstracted by analysts who were blinded to the group assignment.

### Incontinence Self-Management Pamphlet

At randomization, all participants were given a written pamphlet with instructions about standard behavioral self-management strategies for improving bladder control. The pamphlet provided basic patient-directed information about the definition and etiology of incontinence, instructions for performing pelvic floor strengthening exercises, and techniques for urge suppression and bladder retraining. This pamphlet was designed to be consistent with the usual first-line behavioral care of incontinence in the community and to reflect the expected concomitant use of these techniques with yoga in clinical practice. No additional education about incontinence was provided in either the control group or the yoga therapy group.

### Yoga Therapy Program

The yoga therapy program was designed to provide formal instruction and practice in a variety of yoga postures and techniques that were selected by the study's 2 yoga expert consultants (Judith Hanson Lasater, PhD, and Leslie Howard) for their potential to improve incontinence and their appropriateness

for the target population. The study program was based primarily on Iyengar yoga, a form of Hatha yoga that is known for its potential therapeutic applications, has been used successfully for other health-related indications,<sup>22,24,38-44</sup> and differs from other Hatha yoga styles (power yoga, Bikram yoga) in ways likely to maximize both efficacy and safety in older women with incontinence; these are as follows: (1) emphasis on precise anatomical and postural alignment during practice of yoga postures; (2) incorporation of props to minimize risk of injury and accommodate those with lower strength or flexibility; and (3) emphasis on mindful awareness during practice of postures rather than rapid cycling through postures.

The study program focused on a core set of 8 postures that are widely used in Hatha yoga practice, are potentially generalizable to yoga instruction across the country, and can be adapted for women of all ages, including those with decreased flexibility or mobility; these are as follows: Tadasana (mountain pose), Utkatasana (chair pose), Trikonasana (triangle pose), Malasana (squat pose), Viparita Karani Variation (legs up the wall pose), Salamba Set Bandhasana (supported bridge pose), Supta Baddha Konasana (reclined cobbler's pose), and Savasana (corpse pose). While teaching these postures, instructors emphasized specific ways of practicing each posture to foster awareness of the pelvic floor structures and increase control over the pelvic floor muscles, in addition to improving general fitness and conditioning and promoting mindfulness, deep breathing, and relaxation.

Women assigned to the yoga therapy program attended an introductory 90-minute orientation session that provided a general introduction to structure of the yoga therapy program, principles of Iyengar yoga, and use of yoga props. They were then scheduled to participate in two 90-minute group yoga classes per week for 6 weeks led by an experienced certified instructor and an assistant. Participants were also instructed to practice yoga at home for at least 1 additional hour per week and to record the dates and duration of practice in a home yoga diary. Participants were given a limited set of yoga props (mat, belt, and block) to take home and a manual with written descriptions and pictures depicting each of the key yoga postures featured in the classes. Tips on how to practice each posture safely and comfortably and how to adapt each posture to improve incontinence and pelvic floor function were also provided in the manual.

### Wait-list Control

Women randomized to the control group did not attend group yoga therapy classes and were instructed to avoid outside yoga instruction for 6 weeks. At the end of the 6-week study, control group participants were given a \$180 gift certificate for yoga classes at a local yoga studio and a limited set of home yoga props (block, mat, and strap) to take home.

### Clinical Efficacy and Quality of Life Outcomes

The primary clinical efficacy outcome was change in the average frequency of any urinary incontinence episodes from baseline to 6 weeks, assessed with 7-day voiding diaries in which women recorded each time they leaked urine and classified their leakage episodes as stress-type (associated with coughing, sneezing, lifting, or physical activity), urgency-type (associated with a strong need or urge to void), or other-type (not associated with physical activity or with an urge to void).<sup>45,46</sup> Secondary efficacy outcomes included changes in the frequency of urgency-type incontinence, stress-type incontinence, any daytime incontinence, any nighttime incontinence, daytime voids in

the toilet, and nighttime voids in the toilet from baseline to 6 weeks, also assessed with voiding diaries.

Changes in the bothersomeness and impact of incontinence and related urinary tract symptoms were evaluated using the Urogenital Distress Inventory 6 (UDI-6), a 6-item questionnaire that assesses subjective bother associated with incontinence-related symptoms<sup>45</sup>; the Patient Perception for Bladder Condition (PPBC), a single-item questionnaire assessing the degree to which participants consider their bladder condition to be a problem<sup>46,47</sup>; and the Incontinence Impact Questionnaire Short Form (IIQ-7), a 7-item measure of the impact of incontinence on physical activities, emotional health, travel, and social relationships.<sup>45</sup> In addition, participants completed a close-out questionnaire at the end of the study in which they indicated their overall satisfaction with the change in their urine leakage on a 5-point Likert scale, ranging from “very unsatisfied” to “very satisfied.”

### Yoga Process Outcomes

Within the yoga therapy group, adherence to group yoga classes and home practice sessions were monitored using attendance logs and participant diaries. The participants' success in learning to perform yoga postures and techniques was assessed at the 6-week visit using a self-administered yoga posture self-efficacy questionnaire, modeled after a measure used in prior clinical yoga studies,<sup>48</sup> in which women rated their confidence in their ability to successfully execute each of the 8 yoga postures featured in the study program on a 5-point Likert scale (not at all, slightly, moderately, very, or extremely confident). For a more objective measure of participants' success in learning study techniques, a yoga expert consultant (Ms Howard) also observed participants during the last yoga class and rated each participant's ability to perform each of the 8 postures (not at all, slightly, moderately, very, or extremely successful). In addition, a close-out satisfaction questionnaire asked women to indicate at the 6-week visit how easy it would be to continue practicing yoga to improve their incontinence on a 5-point scale ranging from “very difficult” to “very easy.”

### Safety Monitoring

During a 3-week telephone call and a 6-week clinic visit, coordinators asked participants about any negative changes in their health and recorded any reported negative changes as adverse events on standardized forms. Adverse events were considered “serious adverse events” if they met the standard definition of resulting in death, disability, or hospitalization. Participants were also encouraged to call study staff to report any negative changes in their health between scheduled calls or visits.

### Statistical Analyses

Demographic and clinical characteristics of participants randomized to each group were compared using *t* tests for continuous variables and Fisher exact tests for categorical variables. To evaluate the adherence to the yoga therapy program, the proportion of women in the yoga therapy group completing at least 11 and 12 of the total 12 group classes and at least 5 and 6 of the total 6 recommended home practice hours were examined. To evaluate the success of the program in teaching women to practice yoga, we examined the proportion of women who were at least moderately or very confident that they could perform all of the 8 core postures and the proportion of women who were rated by the yoga expert consultant as performing all 8 postures at least moderately or very successfully after 6 weeks.

To evaluate clinical efficacy, we examined changes in the frequency of any urinary incontinence, stress-type and urgency-type incontinence, daytime and nighttime incontinence, and daytime and nighttime voids in the toilet in the yoga therapy versus control group using the analysis of variance models, controlling for baseline frequency of these outcomes. For the evaluation of quality of life outcomes, additional analysis of variance models examined the 6-week changes in scores on the UDI-6, IIQ-7, and PPBC measures of the bothersomeness and impact of incontinence, adjusting for baseline scores on these instruments. Questionnaire scores were transformed as needed to address skewness. Safety analyses compared the proportion of participants with the following: (1) 1 or more adverse events, (2) 1 or more adverse events that were considered likely to be associated with treatment, and (3) serious adverse events between intervention groups using Fisher exact tests.

All study procedures were approved by the institutional review board of the University of California San Francisco (IRB #12-09389). This trial was registered in the clinicaltrials.gov database (NCT01672190).

## RESULTS

### Baseline Characteristics

Of the 92 women who were screened for eligibility by telephone, 32 attended an in-person screening visit, 23 completed a 7-day voiding diary and returned for a baseline visit, and 19 were confirmed eligible and randomized to the yoga therapy group (*n* = 10) or control group (*n* = 9) (Fig. 1). After the randomization, but before the start of the yoga therapy program, 1 yoga therapy participant dropped out of the study citing worsened health, leaving 9 participants in each group.

The mean (SD) age of participants was 61.4 (8.2) years, and the mean number of incontinence episodes per day was 2.5 (1.3). Compared with controls, women randomized to the yoga therapy had slightly lower average diastolic blood pressure, higher average number of daytime and total voids in the toilet per day, and lower average scores on the IIQ-7 but did not differ significantly with respect to the frequency of total, stress-type, urgency-type, daytime, or nighttime incontinence, or scores on the UDI-6 or PPBC measures (Table 1).

### Yoga Adherence and Self-Efficacy

Of the 9 participants who started the yoga therapy program, all 9 (100%) attended at least 11 of the recommended 12 organized yoga classes, and 6 (67%) attended all 12 classes. All 9 (100%) reported completing all 6 hours of recommended home yoga practice. At the 6-week visit, 9 participants (100%) indicated on their yoga posture self-efficacy questionnaires that they were at least moderately confident, and 5 (56%) indicated that they were at least very confident about their ability to execute all 8 core yoga postures (Table 2). The expert yoga consultant rated 100% of these participants as being at least moderately successful in performing all 8 poses, with 2 (22%) being at least very successful. Three participants (33%) felt it would be very easy, and 5 (56%) felt it would be moderately easy to continue practicing yoga to improve their incontinence (Table 2).

### Clinical Efficacy and Quality of Life Outcomes

After 6 weeks, the mean (SD) total frequency of incontinence decreased by an average of 73% from baseline in the yoga therapy group compared with only 13% in the control group (*P* = 0.049; Table 3). Stress incontinence frequency decreased

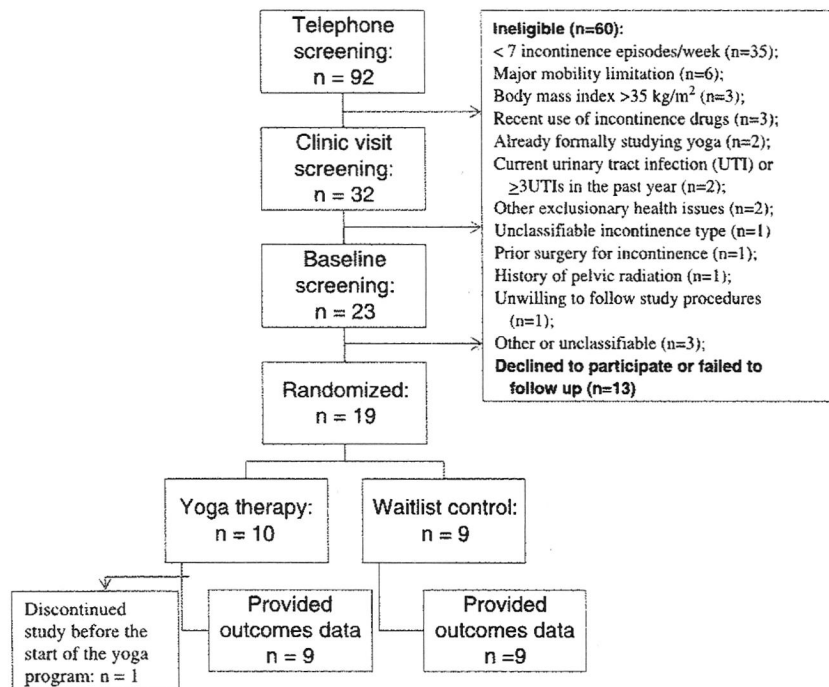


FIGURE 1. Flow chart of participant recruitment, screening, randomization, and follow-up.

by an average of 71% in the yoga therapy group compared with a mean increase of 25% for the control group ( $P = 0.039$ ). No significant differences in the reduction in frequency of urgency incontinence, total daytime or nighttime incontinence, or daytime or nighttime voids in the toilet were detected ( $P < 0.05$  for all; Table 3).

Compared with controls, yoga therapy group participants also demonstrated greater improvement in the subjective bothersomeness of their urinary tract symptoms as measured by scores on the UDI-6 ( $P = 0.004$ ), but no significant treatment effects on scores on the IIQ-7 or PPBC measures were detected (Table 3). In the close-out satisfaction questionnaire, all 9 yoga therapy group participants (100%) who completed the study reported being at least very satisfied with the change in their urine leakage, whereas in the control group, only 1 participant was moderately satisfied and 8 reported “no change in satisfaction.”

### Safety Outcomes

Two participants in each treatment group reported 1 or more adverse events, with 7 adverse events occurring in total. None of these adverse events were musculoskeletal problems considered potentially related to the study, and none were serious adverse events, as defined by the standard criterion of resulting in death, disability, or hospitalization.

### DISCUSSION

In this pilot randomized trial of a group-based yoga therapy intervention, we found that recruiting middle-aged and older women with frequent urinary incontinence was feasible, teaching women to practice yoga to improve their incontinence was achievable and safe, adherence to group yoga classes and home yoga practice was high, and that all women were at least

moderately successful in learning to practice program-specific yoga postures and techniques after 6 weeks. Furthermore, women in the yoga therapy group demonstrated over 50% greater improvement in both total and stress-type incontinence frequency over 6 weeks, and significantly greater improvement in the bothersomeness of their symptoms, compared with participants who received a behavioral self-management pamphlet alone. These results provide promising preliminary evidence to support yoga as a potentially effective and well-tolerated complementary treatment strategy for urinary incontinence in ambulatory middle-aged and older women.

Despite efforts to improve the rates of diagnosis and treatment of incontinence in the community, studies show that many women with incontinence fail to obtain treatment from a health care provider either because they are not asked about or do not report their symptoms, do not have access to a health care provider who is willing and able to treat incontinence, or are unwilling or unable to use conventional medical or surgical treatments.<sup>49–52</sup> Yoga may offer a useful alternative treatment strategy for women who do not have access to incontinence specialists or pelvic floor physical therapists, elect not to use standard behavioral, pharmacologic, or surgical therapies for incontinence, or cannot tolerate these therapies. Yoga may also provide a way for women to supplement or enhance clinical treatment through group classes and home practice sessions based outside the clinical setting. Because yoga can be taught and practiced at many locations without continuous or ongoing supervision by health care providers, it offers a potentially cost-effective community-based management strategy for incontinence, provided that it can be taught in a standardized way and with appropriate attention to patients’ clinical and safety needs.

Based on a systematic search of English-language studies in PubMed and EMBASE conducted on July 29, 2013 using

**TABLE 1.** Baseline Participant Characteristics by Intervention Assignment

	Yoga Therapy (n = 10)	Control (n = 9)	P*
Demographic history			
Age, y	60.5 (8.4)	62.4 (8.3)	0.61
White	8 (80%)	4 (44%)	0.17
Married	7 (70%)	4 (44%)	0.37
Gynecologic history			
No menses in the past year	7 (88%)	4 (40%)	0.07
Oophorectomy	0 (0%)	1 (11%)	0.47
Hysterectomy	2 (20%)	1 (11%)	0.88
Health-related habits			
Current smoker	0 (0%)	2 (22%)	0.21
≥5 alcoholic drinks/wk	4 (40%)	3 (33%)	0.76
Physical examination measures			
Body mass index, kg/m <sup>2</sup>	24.7 (2.7)	25.8 (3.8)	0.46
Systolic blood pressure, mm Hg	116.9 (10.9)	131.2 (20.4)	0.07
Diastolic blood pressure, mm Hg	68.7 (6.7)	78.1 (9.4)	0.02
Clinical incontinence type			
Urgency or urgency-predominant	6 (60%)	6 (67%)	0.78
Stress or stress-predominant	4 (40%)	3 (33%)	
Incontinence frequency, episodes/d			
Total incontinence	2.77 (1.3)	2.16 (1.2)	0.25
Urgency incontinence	1.69 (1.1)	1.21 (1.0)	0.52
Stress incontinence	0.93 (1.1)	0.84 (0.8)	0.76
Total daytime incontinence	2.09 (1.1)	1.44 (0.8)	0.24
Total nighttime incontinence	0.69 (0.7)	0.71 (0.7)	0.82
Frequency of voiding in the toilet, episodes/d			
Daytime voids	9.49 (1.7)	7.40 (2.3)	0.04
Nighttime voids	0.74 (0.4)	0.46 (0.5)	0.21
Total voids	10.23 (1.6)	7.86 (2.3)	0.02
Bladder-specific questionnaires			
IIQ-7	52.3 (38.9)	104.1 (60.0)	0.03
UDI-6	1.6 (0.5)	1.5 (0.4)	0.82
PPBC	3.1 (0.7)	3.1 (0.9)	0.98

Data are presented as mean (SD) or as n (%).

\*P values were calculated using *t* tests or Fisher exact tests as appropriate.

the search term “yoga” with the terms “urinary incontinence,” “urinary stress incontinence,” “urge incontinence,” or “pelvic floor disorders,” this is the first published randomized trial of a yoga intervention for treatment of incontinence. Nevertheless, several small uncontrolled studies have examined the effects of yoga-based interventions on incontinence or other urinary tract or pelvic floor symptoms in special populations. In a study of an integrated yoga program in 11 patients with multiple sclerosis resulting in neurogenic bladder, participants reported before and after improvements in the bothersomeness and impact of their urinary tract symptoms as measured by scores on the UDI-6 and the IIQ-7 after 3 weeks of treatment.<sup>53</sup> In another

uncontrolled study of 9 patients with severe defecation difficulties attributed to puborectalis dysfunction, no meaningful improvements in symptoms were detected after a program of 20 sessions of yogic relaxation and muscle control training.<sup>54</sup> A few small randomized trials have also examined the effects of other specialized muscle-strengthening interventions such as abdominal muscle training, Pilates exercise, and circular muscle strengthening in women with stress urinary incontinence, but results have not supported the efficacy of these treatments for this indication.<sup>55</sup>

Limitations of this pilot trial include its small sample size, which may have resulted in more unstable estimates of

**TABLE 2.** Yoga Adherence and Efficacy Outcomes

	Yoga Therapy Group Participants (n = 9)
Adherence to group classes and home practice*	
Attended all 12 group classes	6 (67)
Attended at least 11 group classes	9 (100)
Completed all 6 recommended home practice hours	9 (100)
Self-reported confidence in performing yoga postures†	
Very/extremely confident about the ability to perform all postures after 6 weeks	5 (56)
At least moderately confident about the ability to perform all postures after 6 weeks	9 (100)
Independent assessment of participants' ability to perform yoga postures‡	
Rated by expert consultant as being very/extremely successful in executing all postures	2 (22)
Rated by expert consultant as being at least moderately successful in executing all postures	9 (100)
Self-assessment of ease of continuing to practice yoga to improve incontinence§	
Very easy to continue practice	3 (33)
Moderately easy to continue practice	5 (56)
Neither difficult nor easy to continue practice	1 (11)
Moderately difficult to continue practice	0 (0)
Very difficult to continue practice	0 (0)

Data are presented as n (%).

\*The adherence to group classes was assessed by attendance logs kept by the class instructors, whereas the adherence to home yoga practice was assessed by diaries in which participants recorded the dates and times of their home yoga practice.

†Participants rated their confidence in performing each of the 8 core postures featured in the yoga therapy program on a 5-point Likert scale (not at all, slightly, moderately, very, or extremely).

‡An expert yoga consultant visited the final group yoga class of the program and independently rated each participant's success in performing each of the 8 core postures on a 5-point Likert scale (not at all, slightly, moderately, very, or extremely).

§Participants in the yoga therapy group were asked to indicate how easy it would be to continue practicing yoga to improve their incontinence at their final (6-week) study visit.

**TABLE 3.** Changes in Frequency of Incontinence and Other Voiding Outcomes Over 6 Weeks by Intervention Assignment

	Yoga Therapy (n = 9)	Control (n = 9)	Difference (95% Confidence Interval)*	P*
Urinary incontinence frequency, episodes/d				
Total incontinence	-1.84 (0.9)	-0.27 (1.7)	-1.40 (-2.79 to 0.00)	0.049
Stress incontinence	-0.71 (0.8)	0.21 (1.1)	-0.98 (-1.89 to -0.06)	0.04
Urgency incontinence	-0.98 (1.0)	-0.48 (0.5)	-0.41 (-1.06 to 0.24)	0.20
Total daytime incontinence	-1.37 (0.9)	-0.35 (1.0)	-0.85 (-1.80 to 0.11)	0.08
Total nighttime incontinence	-0.48 (0.5)	0.08 (0.9)	-0.58 (-1.26 to 0.09)	0.09
Frequency of voids in the toilet, episodes/d				
Daytime voids	-0.68 (1.6)	-0.11 (1.3)	0.01 (-1.45 to 1.47)	0.99
Nighttime voids	-0.22 (0.4)	-0.02 (0.3)	-0.14 (-0.51 to 0.23)	0.43
Total voids	-0.90 (1.7)	-0.13 (1.2)	-0.12 (-1.73 to 1.48)	0.87
Bladder-specific questionnaire scores				
IIQ-7	-29.2 (28.7)	-30.9 (44.8)	-27.7 (-66.8 to 11.4)	0.15
UDI-6	-1.0 (0.8)	-0.1 (0.3)	-0.9 (-1.4 to -0.3)	0.004
PPBC	-1.0 (1.0)	-0.4 (0.9)	-0.6 (-1.4 to 0.2)	0.12

Changes in incontinence and other voiding outcomes are presented as mean (SD).

\*Estimates of between-group differences in outcomes were derived from analysis of covariance models, with adjustment for baseline outcome levels.

frequency and impact of incontinence, and limited study power to detect some clinical outcomes. For example, although we did not detect a significantly greater reduction in urgency incontinence frequency among participants in the yoga therapy compared with that in the control group, definitive conclusions about differential treatment effects on different types of urinary incontinence cannot be made based on a study of this size.

In addition, the wait-list control design used in this study did not control for the time that participants in the yoga therapy group spent during group classes and home practice sessions and may have been associated with low expectations of treatment success. Further research is indicated to compare this yoga intervention with other interventions that require a more substantial time investment and offer more plausible therapeutic benefits for women's symptoms. The yoga therapy program used in this study was also relatively short (6 weeks), and we did not assess whether treatment benefits persisted after the end of the program. Finally, this study was limited to ambulatory middle-aged and older women without complex urologic histories, and the efficacy and safety of yoga therapy may differ for more frail elderly women, women with more complicated incontinence, or those with more severe comorbidities.

Overall, our findings provide preliminary evidence to support the feasibility, efficacy, and safety of a group-based yoga therapy intervention to improve urinary incontinence in ambulatory middle-aged and older women without complicated urologic histories. Future studies involving larger numbers of participants and comparing this yoga therapy intervention to a time-and-attention control intervention are indicated to confirm and extend these findings, assess for differential treatment effects by incontinence type, evaluate for persistence of treatment effects, and examine mechanisms that may mediate the effects of yoga on incontinence.

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