Treating urinary incontinence in the elderly—conservative measures that work: A systematic review

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Practice recommendations

- Behavioral therapy reduces urinary accidents in elderly patients with urge, stress, and mixed incontinence.
- Bladder training is helpful for urge incontinence; pelvic floor exercises are helpful for stress incontinence; both are helpful for those with mixed incontinence.
- The effect of drug therapy in the elderly is unclear, as there are only a few studies of sufficient methodological quality. However, drug therapy is less effective than behavioral therapy.

Abstract

Objective To evaluate the effectiveness of conservative treatment in the community-based elderly (aged ≥55 years) with stress, urge, and mixed urinary incontinence.

Design Systematic review of before-after studies or randomized controlled trials on the effect of exercise and drug therapy in urinary incontinence.

Main outcomes measured Reduction of urinary accidents, patient's perception, cystometric measurement, perineometry, and side effects.

Search strategy MEDLINE (1966–2001), EMBASE (1986–2001), Science Citation Index (1988–2001), The Cochrane Library, and PiCarta were searched.

Results Four before-after studies and 4 randomized controlled trials were identified. *Drug therapy alone:* no study of sufficient quality. *Drug therapy compared with behavioral therapy, 3 studies:* bladder-sphincter biofeedback reduced urinary accidents in cases of urge or mixed incontinence by 80.7%, significantly better than oxybutynin (68.5%) or placebo (39.4%). Adding drug to behavioral treatment or behavioral to drug treatment also resulted in significant reduction in urodynamic urge incontinence (57.5% – 88.5% vs 72.7 – 84.3%). Pelvic floor exercises alone reduced urinary accidents by 48% (compared with 53% for phenylpropanolamine) in patients with mixed or stress incontinence. *Behavioral therapy, 5 studies:* bladder-sphincter biofeedback in case of urge or mixed incontinence, bladder training in case of urge incontinence and pelvic floor exercises in case of stress incontinence reduced the urinary accidents with 68% to 94%.

Conclusion There are only a few studies of sufficient methodological quality on the effect of conservative treatment of urinary incontinence in the elderly. Behavioral therapy reduced urinary accidents; the effect of drug therapy is unclear. We recommend behavioral therapy as first choice.

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The physiologic goals of treatment are strengthening urethral resistance or reducing detrusor muscle contractions. Behavioral techniques—pelvic floor exercises and bladder training with biofeedback—and pharmacotherapy are the treatments of choice for the elderly, provided it is possible to assess the likely health gains. Surgery, the most invasive and riskiest treatment, is usually a last resort.

METHODS

The authors performed computerized searches of MEDLINE (1966–2001), EMBASE (1986–2001), the Science Citation Index (1988–2001), the Cochrane Library, and PiCarta. The search was limited to publications in English and Dutch. Search terms were *elderly* and *aged* combined with *urinary incontinence* and *conservative management, conservative therapy, conservative treatment, bladder training, drug treatment, pelvic floor muscle training, behavior management, behavior therapy,* and *biofeedback*. We supplemented this search strategy by checking articles referenced in other publications.

The titles and abstracts were then screened for the following inclusion criteria: longitudinal cohort, before-after studies or randomized controlled trials, age ≥55 years, community-dwelling population, and conservative therapy.

The methodological quality of the selected studies was evaluated by a modified Delphi-2 scale. (This scale is available online at www.jfponline.com, as **Table W1**).[10] Two researchers (TT, AJ) scored the studies independently; they were blinded for information on authors and journals. In cases of disagreement, the researchers met to reach consensus.

After meeting inclusion criteria, randomized controlled trials were scored from 0 to 9; before-after studies from 0 to 3. A randomized controlled trial needed a score of at least 7 to be included; a before-after studied needed a 2.5; in trials where blinding was not possible, a 4 was needed.

Types of incontinence

Stress incontinence is involuntary leakage on effort or exertion, or on sneezing or coughing. Stress incontinence may result from diminished bulk and tone of perineal tissue or weakness of the pelvic floor muscle.

Urge incontinence is involuntary leakage accompanied by or immediately preceded by urgency. Causes are "deconditioned" voiding reflexes due to chronic low-volume voiding, infection, or bladder stones.

Mixed incontinence is involuntary leakage associated with urgency and with exertion, effort, sneezing, or coughing.

RESULTS

The search yielded 157 publications; 135 studies did not meet inclusion criteria. Of the 22 remaining studies, 6 were excluded because they did not use a general population. Consequently, 16 studies were included: 6 with a before-after design and 11 randomized controlled trials.

Methodological quality

The quality scores for the 6 before-after studies ranged from 0 to 3. Two studies scored less than 2.5 and were excluded. (Information on excluded studies is available online at www.jfponline.com as **Table W2**.)

Quality scores for the 11 randomized controlled trials ranged from 0 to 9. Four of the 5 studies with the possibility to blind scored <7, and 3 of the 6 studies with no possibility to blind scored <4; they were excluded.[11,18]

Results of drug and behavioral therapy

In 3 studies, the effect of medication alone or in combination with behavioral therapy was examined (**Table 1**).

Biofeedback is superior. Burgio et al[19] studied the effect of bladder-sphincter biofeedback vs oxybutynin and placebo in 190 women with urge or mixed incontinence. Oxybutynin is an anti-

TABLE 1

Effect of medication and exercises on urinary incontinence in the elderly

Study, quality scores	N*, (drop-outs)	Population, age (mean, SD)	Definition of incontinence	Intervention and duration (design)	Measurements and outcomes†
Burgio[19] (1998), 7.5/7	190 (7)	General, 55–92 (69.3 ± 7.9)	At least 2 urge accidents per week for 3 months (urodynamic predominant UI)	Bladder-sphincter bio-feedback twice weekly; 2.5 mg oxybutynin 3 times daily; placebo weeks (RCT)	**1. Biofeedback group:** 15.8 → 2.8 (mean 80.7% ± 24.8) **Drug group:** 15.9 → 5.7 (mean 68.5% ± 37.2) **Placebo:** 15.4 → 8.2 (mean 39.4% ± 80.0) **2. Biofeedback group:** 96.5% satisfied with treatment **Drug group:** 54% satisfied with treatment **3. Drug group:** bladder capacity increased significantly **4. Drug group:** mouth dryness significantly more often
Burgio[20] (2000), 3/3	35 (0)	Subjects not dry or not satisfied after 1 intervention (1998 study), 55–91 (67.7 ± 7.5)	Not given	If behavorial training alone in 1998 study, added drug therapy; if drug therapy alone in study, added behavorial therapy for 8 weeks (B-A)	**1. Behavorial therapy → + drug:** 57.5% → 88.5% (n=8) **Drug → + behavorial therapy:** 72.7% → 84.3% (n=27) **Drug → behavorial therapy:** 59.1% → 77.1% (n=19) **Placebo → behavorial therapy:** 22.9% → 63.9% (n=34) **Placebo → drug:** 44.8% → 76.5% (n=10)
Wells[21] (1991), 3.5/3	115 (38)	Open population, 55–66 (66 ± 8)	Urinary loss of any degree (urodynamic SI, UI, or MI)	PFE for 6 months or 100 mg/d for 2 weeks (RCT)	**1. PFE group:** 48% improved **PPA group:** 53% improved **2.** Subjective improvement not significantly different between groups **5.** Endurance peak and endurance time of contractions similar in both groups. Digital test of pelvic muscle strength was significantly better in the PFE group

* N includes no men

† Measurements and outcomes are:

1. Severity, reduction urinary accidents daily bladder record
2. Severity, patient's perception
3. Cystometric measurements
4. Side effects
5. Perineometry

SD, standard deviation; SI, stress incontinence; UI, urge incontinence; MI, mixed incontinence; RCT, randomized controlled trial; B-A, before-after; PFE, pelvic floor exercise; PPA, phenylpropanolamine

cholinergic drug that reduces detrusor muscle contractions. Anorectal biofeedback helped patients sense pelvic muscles and taught them how to contract and relax these muscles selectively while keeping abdominal muscles relaxed. Patients were taught not to rush to the toilet as a response to the bladder sensation but relax the whole body and contract the pelvic floor. The reduction of urinary accidents in the daily bladder report was significant. This effect was significantly better in the bladder-sphincter biofeedback group compared with the drug group; the drug group had results significantly better than the placebo group.

Success with augmented therapies. Subsequently, researchers offered the patients who

TABLE 2

Effect of behavioral therapy in the elderly with urinary incontinence

Study, quality scores	N* (% men), dropouts	Population, age (mean, SD)	Definition of UI (type of incontinence	Intervention + duration of intervention (design)	Measurements and outcomes†
Baigis-Smith[26] (1989), 3/3	54 (17%), 0	General population 60–86 (74.4 ± 7.2)	At least once every 2 weeks (SI, UI, MI by history)	PFE and biofeedback until improvement (B–A)	**1.** 17.4 → 4.2 / week (78%) for all types of incontinence **2.** 90% quality of life improved **4.** Peak and duration of contraction improved significantly for all types of incontinence
Burgio[24] (1985), 3/2.5	39 (23%) 0	General population, 65–86 (74.4 ± 7.2)	At least once a month (urodynamic SI, UI, DI)	Bladder and sphincter biofeedback 2–4 times weekly, 1–8 sessions depending on progress (B–A)	**1. SI:** 30.5 → 7.5 / week (82%, n=19) **DI:** 8.5 → 1.5 / week (85%, n=12) **UI:** 5.4 → 0.4 / week (94%, n=8) **3.** No changes **4.** Amplitude significantly higher at the end of treatment for SI
Fantl[25] (1991), 4.5/4.5	123 (0%) 0	General population, 55–90 (67 ± 8)	Not given (urodynamic UI, SI, or MI)	Bladder training/ control for 6 weeks (RCT)	**1. SI:** 23 → 10 / week 22 → 19 / week (n=88)] **DI ± SI:** 16 → 6 / week [control: 24 → 19 / week (n=35)] **DI:** 11 → 5 / week [control: 20–18 / week (n=14)] **SI + DI:** 20 → 7 / week [control: 29 → 20 / week (n=20)]
McDowell[22] (1992), 3/3	29 (7%), 18	Self-referred to incontinence program or referred by physicians/ geriatricians, 56–90 (74.6 ± 8.1)	At least once every 2 weeks for at least 3 months (SI, UI, MI in bladder diary)	Bladder-sphincter biofeedback twice weekly, duration depending on the patient's progress and abilities, average 5.6 sessions (B-A)	**1. MI:** 85%, n=21 **UI:** 68%, n=7 **Total:** 16.9 → 2.5 / week (82%)
McDowell[23] (1999), 5/5	93 (10%), 10	Individuals with incontinence were identified from 2 large HHAs and asked to participate, 60–97 (76.7 ± 7.2)	At least twice a week for at least 3 months (SI, UI, MI in bladder diary)	Bladder-sphincter biofeedback weekly/placebo (crossover) for 8 weeks (RCT)	**1. Treatment group:** 4.0 → 1.7 / day (median 75%), urge accidents, 2.1 → 0.9 / day; stress accidents 0.9 → 0.3 / day **Control group:** 4.1 → 3.5 / day

* N = number of completers

† Measurements and outcomes are:

1. Severity, reduction urinary accidents daily bladder record
2. Severity, patient's perception
3. Cystometric measurements
4. Perineometry

SD, standard deviation; SI, stress incontinence; UI, urge incontinence; MI, mixed incontinence; B-A, before-after; RCT, randomized controlled trial; PFE, pelvic floor exercise; HHA, home health agency

were not completely dry to participate in an extension study, which added drug therapy for those in the behavioral therapy group and vice-versa.[20] Thirty-five women participated in this study. Both groups had additional significant reductions in urinary accidents as documented in the bladder diary.

Pelvic floor exercises helpful. Wells et al[21] compared 6 months of pelvic floor exercises without biofeedback with 2 weeks of phenylpropanolamine hydrochloride, an alpha-adrenergic agonist. (Note that in the US this product has been taken off the market.) Alpha-adrenergic agents stimulate the receptor located in the urethra, increasing urethral pressure. The subjects were 115 women with urodynamic mixed or stress incontinence.

The reduction in urinary accidents was similar in both groups—48% and 53%, respectively. Also the subjective improvement was similar. Only the digital test of pelvic floor muscle strength was significantly better in the pelvic floor exercise group.

Results of behavioral therapy only

Five studies focused on the effect of behavioral therapy only (**Table 2**). Three surveys studied the effect of bladder-sphincter biofeedback, 1 the effect of bladder training without biofeedback, and 1 the effect of pelvic floor exercises with biofeedback.

McDowell et al[22,23] used anorectal biofeedback, demonstrating the abdominal pressure and pelvic floor activity to teach patients to relax abdominal muscles selectively and contract/relax the pelvic floor in case of stress, urge, and mixed incontinence. The home exercises consisted of 10 to 15 contractions of the pelvic floor muscles for 10 seconds, followed by an equal period of relaxation in a lying, standing, and sitting position 3 times a day.

They also taught urge strategies. Patients were taught not to rush to the toilet but to relax the whole body, contract the pelvic floor, and increase their voiding interval until they achieved an interval of 2 to 3 hours.

3 studies concluded that bladder-sphincter biofeedback reduced accidents significantly

In Burgio et al,[24] researchers filled the bladder after voiding; this taught patients to be aware of bladder contractions before they felt any bladder sensation, and to relax the abdominal muscles, contract the pelvic floor, and try to diminish the bladder pressure.

The conclusion of all 3 studies was that bladder-sphincter biofeedback reduced the urinary accidents for stress, urge, and mixed incontinence significantly.

Fantl et al[25] examined the effect of bladder training in 123 women with urge incontinence. They were asked to increase their voiding interval until a schedule of once every 3 hours was achieved, or they were admitted to a control group without intervention. Bladder training reduced the urinary accidents significantly for all 3 types of urinary incontinence.

Baigis-Smith et al[26] investigated the influence of behavioral intervention in 54 patients who received pelvic floor biofeedback without measuring the abdominal pressure as in previous studies. Patients had to relax and contract their pelvic floor 50 times for 10 seconds, 3 times a day, until they experienced improvement. The number of urinary accidents reduced from 17.4 times a week to 4.2 times a week for stress, urge, and mixed incontinence.

DISCUSSION: CONSERVATIVE THERAPY EFFECTIVE

This review discusses 3 types of behavioral therapy for urinary incontinence: bladder training for urge incontinence (sometimes in combination with pelvic floor exercises), pelvic floor exercises for stress incontinence, and both for mixed incontinence. All 3 types of behavioral therapy reduced urinary accidents in the elderly.

Remarkable is the conclusion of Fantl et al[25] that bladder training is also effective for stress

Given its effectiveness, behavioral therapy for incontinence should be promoted more

incontinence alone. In almost all previous studies on the effectiveness of bladder training, patients with stress incontinence were excluded. More research is needed before we can recommend this therapy for stress incontinence.

Few studies met our methodological quality criteria. The selected studies were difficult to compare because of differences in treatment, methods, and outcomes. For that reason, more research with standardized outcome measures can help establish the relative effectiveness of behavioral therapy—with or without biofeedback—and to evaluate the effect of each therapy in different types of incontinence.

We found 2 methodologically good surveys about the effect of pharmacotherapy in elderly with urinary incontinence. Just 1 study focused on the effect of anticholinergic agents on urge incontinence and mixed incontinence; it found these agents less efficacious than behavioral therapy but better than placebo.

We also found 1 study on alpha-adrenergic agents for stress or mixed incontinence—their ability to reduce urinary accidents seemed comparable with pelvic floor exercise. The weakness of this study was the lack of a control group.

It was remarkable, however, that pelvic floor exercise was less efficacious compared with the other studies. We need more double-blinded randomized controlled trials to prove clinical efficacy of pharmacology in the elderly with urinary incontinence. In studies with a younger population, anticholinergic agents seem to be effective for urge incontinence, but the effect of adrenergic agents in a younger population is unclear, and has never been investigated in men.[27–29]

CONCLUSION

Conservative therapy is effective for elderly patients with stress, urge, or mixed incontinence. Given the effectiveness of behavioral therapy, the absence of the side effects, and its low cost and ease of practice at home, we recommend it as the therapy of choice for urge incontinence in the elderly. We propose pharmacotherapy as second-line therapy for urge incontinence. Surgical treatment should be reserved for those who doo not respond to either of these.

Given the success posible with conservative measures, physicians should routinely ask elderly patients about incontinence.

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Evidence-based medicine terms

THE JOURNAL OF FAMILY PRACTICE uses a simplified rating system derived from the Oxford Centre for Evidence-based Medicine. More detailed definitions may be found at its website: http://www.cebm.net/levels_of_evidence.asp.

Level of Evidence characterizes the validity of a study while making no specific practice recommendation

- **1a** Systematic review of randomized controlled trials
- **1b** Individual randomized controlled trial with narrow confidence interval
- **1c** All or none—all patients died before therapy was available, but now some survive; or, some patients died before therapy was available, but now all survive
- **2a** Systematic review of cohort studies
- **2b** Individual cohort study, or low-quality randomized controlled trial
- **2c** "Outcomes" research
- **3a** Systematic review of case-control studies
- **3b** Individual case-control study
- **4** Case series, or poor quality cohort or case-control studies
- **5** Expert opinion

Strength of Recommendation translates a given level of evidence into a practice recommendation

- **A** Includes 1a–c levels of evidence
- **B** Includes levels 2a–c and 3a, b
- **C** Includes levels 4 and 5

Strength-of-recommendation ratings do not always reflect a direct one-to-one correspondence with levels of evidence, as depicted above, but may take into account such variables as intervention cost, ease of use, and impact of the disease in the population.