

Effect of physical activity on urinary incontinence in women: Implications for providers

By Kimberly J. Angelini, WHNP-BC, PhD(c)

A growing number of young women are participating in high-intensity, high-impact physical activities that can cause urinary incontinence (UI). Many of these women may not report this problem during routine health examinations, perhaps because of embarrassment or unawareness that it can be treated. The author raises healthcare providers' awareness of the need to screen this population for UI and then make the diagnosis and treat it when indicated.

KEY WORDS: female athlete, urinary incontinence, pelvic floor muscles, stress urinary incontinence, urge urinary incontinence



Now, more than ever, young women are participating in athletics and fitness training. Many of these women experience urinary leakage while performing high-impact, high-intensity physical activities. In fact, studies suggest that female athletes and participants in exercise classes and fitness training, when compared with the rest of the female population, have increased rates of urinary incontinence (UI).¹⁻³ For a variety of reasons, women with signs and symptoms of UI may hesitate to mention the problem to their healthcare provider (HCP). Therefore, HCPs need to consider the effects of vigorous exercise on the female body—especially the pelvic floor—and screen for, diagnose, and treat UI in members of this otherwise healthy population.

Definitions and prevalence

The International Continence Society defines UI as any involuntary leakage of urine.⁴ UI can be a chronic debilitating condition for both men and women, but is more common among women. In a survey of almost 18,000 U.S. adults,

more than 50% of women reported it.⁵ UI is subcategorized as stress, urge, or mixed. Stress UI (SUI) occurs when the pelvic floor muscles (PFMs), predominantly the detrusor, cannot hold urine during times of increased intra-abdominal stress or pressure on the bladder—for example, during coughing, sneezing, laughing, or jumping.⁶ Urge UI (UUI) is defined as urinary frequency accompanied by a sudden and urgent need to urinate that cannot be deferred; leakage often occurs prior to reaching the bathroom.⁷ Mixed incontinence is a combination of SUI and UUI, and is more prominent as women age.

Although UI is usually perceived as a disorder affecting the elderly, younger women, especially athletes, may be at increased risk for it as well. The effect of regular high-impact, high-intensity physical activity on the PFMs remains underexplored, but some concerning data have emerged.

- A recent systematic review showed that SUI prevalence was common even in young women, especially in those engaged in activities that involved bouncing, jumping, or heavy weight lifting.²
- Another recent systematic review reported SUI rates of 28%–80% among female athletes participating in basketball, softball, volleyball, track, cheerleading, or gymnastics, among other sports.¹
- High rates of SUI/UUI have been reported by professional female athletes, including trampolinists (72.7%),³ soccer players (62.8%),⁸ elite runners and cross country skiers (45.5%),⁹ and volleyball players (65.7%).¹⁰
- A cross-sectional study showed higher rates of SUI in middle-aged women who reported high levels of strenuous physical activity as teenagers.²

- A study showed that, 1 year postpartum, urinary leakage rates were higher in first-time mothers who reported pre-pregnancy involvement in high-intensity physical activity than in those who engaged in low-impact activity.¹¹

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Adverse consequences of UI range from nuisance effects, which occur when incontinence is infrequent and results in small amounts of urine loss, to severely debilitating effects on quality of life. In the general population, moderate to severe cases of UI have been linked to depression, social isolation, inability to engage in exercise, falls and fractures, and admission to long-term care facilities in the elderly.^{12–15} Female athletes with UI have reported that the condition has led to compromised sports performance, embarrassment, and a limitation on social activities.¹

Pathophysiology of urinary incontinence

The PFMs comprise superficial and deep layers of muscles that support the organs inside it (bladder, uterus, and rectum) and the sphincter muscles, which maintain constriction and relaxation of orifices contained

therein. The pelvic diaphragm spans like a hammock in the pelvic bowl and is dynamic, responding passively (elastic) and actively (tonic) to changes in intra-abdominal pressure with breathing and exertion.¹⁶ The bladder, the most anterior organ in the pelvis, and the urinary sphincters contract and dilate in response to urine volume.

The three main causes of UI are detrusor overactivity, urethral sphincter weakness or dysfunction, and PFM weakness. When the bladder is full—that is, when urine volume is 200–350 mL—and a person has an urge to urinate, the detrusor contracts and the sphincters relax to evacuate urine.¹⁷ However, if the detrusor is overactive and unstable, one may feel a sense of urinary urgency. If the sphincters, normally under one's control, weaken, one can experience UI. Likewise, if the PFMs become weak or hypertonic, a person can experience UI.

Although the pathophysiology of UI in young women who participate in high-impact, high-intensity physical activities has not been fully elucidated, a literature review suggests that these activities may strengthen or thicken the PFMs to such an extent that they become hypertonic.¹⁸ Hypertonicity of the PFMs can hinder the ability of the pelvic floor to respond dynamically to increased pressure, resulting in SUI during activities involving high impact or increased pressure.^{16,19} By contrast, one study showed that PFM strength was *decreased* in athletes relative to non-athletes because of chronic overstretching and strain.²⁰ Still another study demonstrated that short-term fatigue of the PFMs in women with SUI occurred after prolonged strenuous physical activity, suggesting that endurance of the muscles may be compromised.²¹

In postmenopausal women, gen-

itourinary atrophy, which develops as a result of estrogen deficiency, is associated with UI. Female athletes may also be at risk for estrogen deficiency and resultant genitourinary atrophy if they have exercise-induced anovulation/oligo-ovulation or anorexia athletica involving excessive workouts and calorie restriction.¹⁸ In fact, eating disorders among female athletes have been associated with a higher prevalence of both SUI and UUI.¹⁸ In a study of elite female athletes in Norway, the prevalence of SUI and UUI, respectively, was significantly higher in athletes with eating disorders (49.5%, 20%) than in athletes without eating disorders (38.8%, 15%).²² Findings from a study of female long-distance runners demonstrated an association between eating disorders and UI.²³ In addition to the estrogen deficiency associated with anorexia in young females, nutritional deficits may inhibit the building and strengthening of muscles, ligaments, and fascia. Finally, excessive self-induced vomiting associated with some eating disorders may contribute to repetitive high pressure on the PFM.¹⁸

Implications for patient care

More research is needed to fully inform HCPs on how to best counsel their female patients with regard to engagement in high-impact, high-intensity physical activities. Regardless, there is a likely benefit to screening for UI and monitoring pelvic floor health among women who do engage in these activities. When UI is identified through screening, further evaluation is needed to make a specific diagnosis and guide treatment. A history, a physical examination, and a simple urinalysis are usually adequate for this purpose, especially in other-

Box. Minute quiz for incontinence

1. Have you leaked urine in the past 3 months? Yes No
2. If yes, when did it occur?
 - a. With physical activity/impact such as coughing, sneezing, or jumping? (SUI)
 - b. When you had an urge or had trouble getting to the bathroom in time? (UUI)
3. Which of the following situations is the most likely to lead to leaking?
 - a. Coughing
 - b. Sneezing
 - c. Jumping
 - d. Nothing in particular; I just feel a sudden urge to urinate
4. How much do any of the problems listed above bother you?
 Not at all A little A lot

wise healthy women. Specialized urodynamic studies are not usually needed unless the etiology of the UI is unclear.²⁴

Screening

HCPs should screen for UI in all women who have been identified as being at risk for it, but especially those who are at *increased* risk for it as a result of their athletic pursuits. These women may not offer information about UI unless asked; one study showed that more than 90% of female high school and college athletes who had episodes of UI during sports had never mentioned their problem to anyone.²⁰ Suggested screening questions for UI are listed in the *Box*.

History

The history helps determine UI type and symptom severity. HCPs should ascertain contributing factors or other causes such as an underlying health condition (e.g., diabetes), past gynecologic surgery, or use of certain medications. In conducting a detailed review of the chief complaint, HCPs should inquire about

the presence of urgency, frequency, and nocturia (UUI) and the leaking of urine with exertion (SUI).

Validated UI questionnaires can aid in assessment of symptom severity and the degree of bother to the patient.^{1,24} Bladder diaries can provide information about fluid intake, voiding patterns, urine leakage episodes, and activity that might precipitate the leakage. A daily bladder diary from the National Institute of Diabetes and Digestive and Kidney Diseases is available [here^A](#).

Physical examination

The physical exam should include inspection of the external genitalia and vagina for signs of vulvovaginal atrophy, abnormal vaginal discharge that may be confused with incontinence, masses, or pelvic organ prolapse. Digital pelvic assessment of the PFM, a vital part of every pelvic exam, is simple to perform. The HCP inserts two fingers through the vaginal orifice and palpates the pelvic muscle at 5 and 7 o'clock as the woman squeezes. The HCP notes symmetry, strength, and relaxation with long holds (5 seconds) and

short holds (1-2 seconds).

Sensorimotor function of the perineum and lower extremities should be assessed if the health history raises concern about neurologic disease. Abdominal palpation and bimanual pelvic examination are included to assess for prolapse, fibroids, and tenderness. A positive cough stress test in which there is visible fluid loss from the urethra occurring simultaneously with the cough is diagnostic of SUI.²⁴ A dipstick urinalysis on a clean catch urine sample can be done in the office to assess for the presence of nitrites and leukocytes (to rule out urinary tract infection).

Treatment

Treatment of UI in athletes is directed at identified contributing factors such as hypertonic or hypotonic PFM. A discussion with the patient about her goals and expectations from treatment facilitates shared decision making to best suit her needs.

Non-drug interventions

Healthcare providers can recommend simple behavior changes that may help reduce or prevent UI during physical activity. Strategies to reduce episodes of UUI include avoiding ingestion of bladder stimulants (e.g., caffeine, alcohol) and avoiding excessive fluid intake, albeit not to the point of possible dehydration. Measures to reduce episodes of SUI include voiding prior to engaging in physical activity, routine performance of **Kegel exercises^B**, and use of the **Knack technique^C**, which involves contraction of the PFM prior to and during specific physical activities (e.g., before landing a jump, sneezing, or lifting a toddler).²⁵

Behavioral interventions such as Kegel exercises are recommended as first-line therapy for the prevention

and treatment of UI.²⁶ Kegels are easy to teach and should be part of the educational armamentarium of all HCPs who treat women. Consultation with or referral to a physical therapist or women's health nurse practitioner who specializes in women's pelvic health is advisable if the patient has hypertonicity or weakness of the PFM.

Another non-drug option, the incontinence ring pessary (*Figure*), is effective in the treatment of SUI and can be placed in the office. Surgical sling procedures, although invasive, can be effective in long-term management of SUI.



Pharmacotherapy

Medications to treat UI are usually considered only after physical and behavioral therapies are tried. FDA-approved medications for treatment of UUI include anticholinergic antimuscarinic agents (e.g., oxybutynin, tolterodine), which inhibit involuntary detrusor contractions, and a beta agonist (mirabegron), which relaxes the detrusor and increases bladder capacity.²⁴ Anticholinergics may impede the ability to sweat, and are not recommended for athletes because of the increased risk for heat stroke. No medications are FDA approved for the treatment of SUI. Pseudoephedrine hydrochloride has been used off label for this purpose, but this agent is prohibited from being used during many athletic competitions. Duloxetine, a dual serotonin and norepinephrine reuptake inhibitor, has also been used off label for SUI.¹⁸ Discontinua-

tion rates for all of these medications are high because of unwanted side effects (e.g., dry mouth, constipation).^{24,27}

Prevention

Even better than treating UI in female athletes is preventing it. HCPs should educate patients engaging in vigorous physical activities about maintaining pelvic floor health; in one study, more than 90% of women had never heard about Kegels or PFM therapy.²⁸ Teaching women about PFM strengthening during physical activity, as well as PFM relaxation and stretching techniques, can help reduce their risk of developing UI.

Conclusion

Healthcare providers should use their assessment skills to uncover a hidden problem of UI in young female athletes. They can provide education and referrals for management that will improve quality of life and prevent future problems related to PFM dysfunction. Prevention of PFM dysfunction can begin with education about Kegel exercises as an integral part of athletic or fitness training, especially in sports that are high impact and high intensity. ●

Kimberly J. Angelini is a women's health nurse practitioner and a doctoral student at Boston College in Chestnut Hill, Massachusetts.

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Web resources

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- B. niddk.nih.gov/health-information/urologic-diseases/bladder-control-problems-women/kegel-exercises
- C. pelvicexercises.com.au/control-bladder-leaks/