

Pelvic Floor Therapy for Athletes with Urinary Incontinence: A Critically Appraised Topic

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Clinical Question: *Do pelvic floor exercises decrease the occurrence of urinary incontinence in female volleyball athletes?*

Clinical Bottom Line: *There is limited, but consistent evidence that pelvic floor exercises are beneficial in decreasing urinary incontinence in volleyball athletes. It is important that a training protocol is developed by an interprofessional care team for high impact sport athletes to mitigate the occurrence of urinary incontinence in sport.*

Keywords: *Female Athlete, Women's Health, Stress Incontinence, Pelvic Floor Therapy for Athletes with UI*

Introduction/Clinical Scenario

Urinary incontinence (UI) is the eighth most prevalent chronic medical condition among women, affecting 27.5%-45% of young and middle-aged women.¹⁻² Women with UI often experience urine leakage and increased frequency of urination.³ Multiple subtypes of UI exist, with the most common being stress, urgency, and mixed. Stress urinary incontinence (SUI) is 'the complaint of involuntary loss of urine on effort of physical exertion or on sneezing or coughing'.⁴ Stress urinary incontinence is thought to be due to a hypermobility of the bladder and urethra and weakness within the urinary sphincter.⁵ Muscles of the pelvic floor (e.g., levator ani) experience atrophy, which then prevents those muscles from properly supporting the bladder and urethra complex, leading to SUI.⁵

Two opposing theories address pelvic floor strength in female athletes: female athletes

have strong pelvic floor muscles, preventing SUI and female athletes may overload and weaken the pelvic floor, causing SUI.⁶ Nulliparous female athletes involved in high impact training have increased cross-sectional areas of the levator ani and increased width of the puborectalis muscles. This hypertrophy response is believed to be due to increased intra-abdominal pressure from sport participation.⁷ Although these adaptations seem like they would protect against SUI, up to 80% of women experience SUI during physical activity.⁸ This may be more pronounced in sports like volleyball, where jumping and landing is inherent.⁹⁻¹⁰ Pelvic floor fatigue and decreases in pelvic floor muscle pressure production are thought to weaken the pelvic floor, contributing to SUI risk.¹¹ These changes may be intensified as the muscles fatigue because strenuous exercise can decrease the maximum contraction

of the pelvic floor muscles.¹² Altered muscle activity could result in decreased abdominal pressure in athletes.¹³ This is especially problematic, as jumping causes a rapid increase in abdominal pressure,¹⁴ which the pelvic floor muscle may not be able to counteract, increasing the risk of SUI. Furthermore, female athletes are embarrassed about SUI, including concerns about urine leakage during activity¹⁵ especially in sports with tight clothing, such as volleyball.¹⁶

Focused Clinical Questions

Do pelvic floor exercises decrease the occurrence of urinary incontinence in female volleyball athletes?

Search Strategy

A search of PubMed, Cochrane, and Google Scholar was conducted in June of 2021 using the following PIO (patient group, intervention, outcome) setup to generate a Boolean phrase. Boolean phrase: Pelvic floor therapy AND athletes, Pelvic Floor OR urinary incontinence AND athletes, stress incontinence AND athletes, Pelvic floor muscle training AND athletes, Pelvic floor AND physically active, Pelvic Floor therapy, Pelvic floor muscle training, Rehabilitation, Pelvic Muscle.

- Patient group: Female Athletes
- Intervention: Pelvic floor exercises

Evidence Quality Assessment

Internal validity on the selected studies was assessed using the PEDro scale, as all were randomized control trials. The PEDro scale consists of 11 questions, where the first criterion

Results of Research

In total our search yielded 1,470 records (six from PubMed, five from Cochrane, 1,460 from Google Scholar). A summary of search results can be seen in Figure 1. Each article

Female athletes with SUI may benefit from pelvic floor exercises, which are designed to increase the support provided by the pelvic floor muscles.^{12,17} These therapeutic exercises, as well as patient education, can be used for treatment and management of SUI. This study aims to investigate current literature regarding the influence of pelvic floor exercises on urinary incontinence in female athletes.

- Outcome: Decrease in urinary incontinence during sport

Inclusion criteria were:

- Studies performed in the past 10 years
- Studies on female athletes
- Studies that used pelvic floor exercises
- Studies published or available in English

Exclusion criteria were:

- Studies performed on males
- Studies using electrical biofeedback

influences external validity of the study and the response is not included in the reported score which has a maximum value of 10.¹⁸

included was performed in the last seven years and utilized experimental and control groups. The two articles included in Table 1 met all inclusion criteria and were selected for inclusion

in this CAT. Both studies demonstrated improvements of SUI symptoms following a 3- and 4-month training intervention.¹⁹⁻²⁰

Figure 1 – Summary of search results

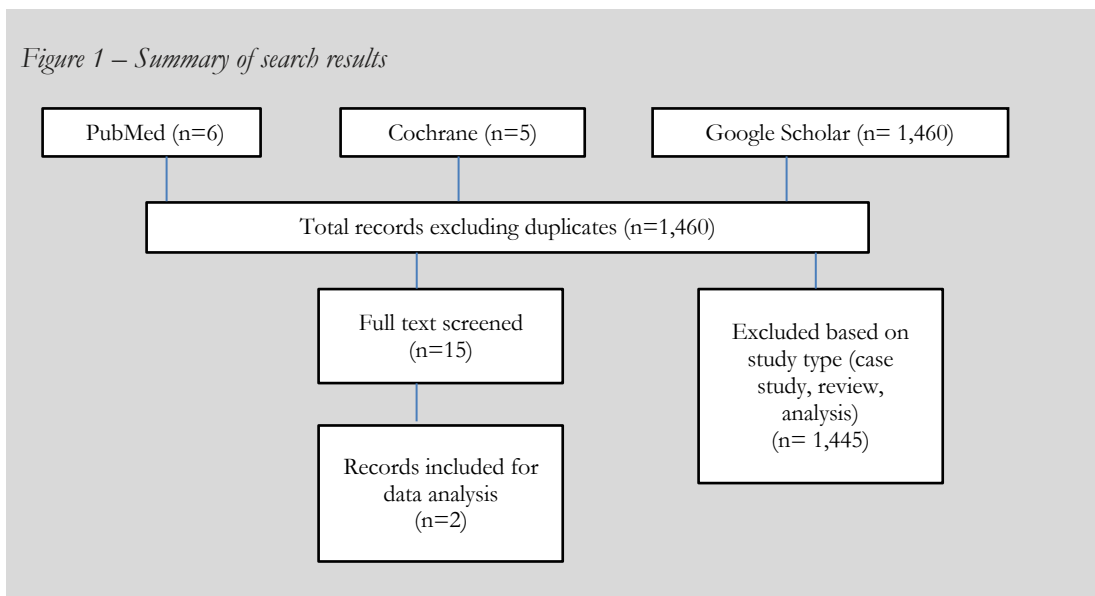


Table 1
Means and Standard Deviations

Article	N	Mean	SD	p-value	95% CI	Odds Ratio
Ferreira et al.	32	EG 2	1.28	0.324	1.37-2.63	.4545
		CG 0.2	0.41		-0.001-0.401	
Pires et al.	13	EG 1.29	1.70	0.741	0.03-2.55	0.1500
		CG 2	1.67	0.025	0.66-3.34	

- Data for Urinary incontinence included in the chart.
- EG = experimental group; CG = control group

Results of Evidence Assessment

The PEDro checklist was selected to assess the quality of evidence in both studies as an objective measure out of 10 criteria. Ferreira

et al.¹⁹ and Pires et al.²⁰ both scored a 9/10 only losing one point on investigator blinding.

Clinical Bottom Line

There is consistent supporting evidence that pelvic floor exercises are beneficial in decreasing urinary incontinence in volleyball athletes. Urinary leakage symptoms significantly

improved in both studies following the intervention.¹⁹⁻²⁰ The non-invasive pelvic floor exercises were completed at home in both studies,¹⁹⁻²⁰ as well as part of training in Pires et

al.²⁰ There was SUI in athletes who participated in these studies,¹⁹⁻²⁰ which is in support of Bo's theory that physical activity can overload and weaken the pelvic floor.⁶ Healthcare providers should utilize pelvic floor exercise interventions for female volleyball athletes with SUI. These

Strength of Recommendation

Results from the included studies support the use of pelvic floor exercises to decrease urinary incontinence in female volleyball athletes. However, study type limits the strength

Implications for Practice, Education, and Future Research

The purpose of this CAT was to review the evidence to determine if pelvic floor exercises were effective in decreasing urinary incontinence in volleyball athletes. The evidence supports this question showing a significant decrease in incontinence when pelvic floor exercises are implemented.^{19, 20} Based on the results of this CAT, pelvic floor education and strengthening are options for high impact athletes experiencing SUI symptoms. When working with an athletic female population, physicians and athletic trainers should recognize athlete concern of SUI and refer to physical therapists with expertise in pelvic floor therapy. Ferreira et al.¹⁹ and Pires et al.²⁰ both found pelvic floor exercise significantly reduce urinary incontinence. Both studies evaluated the intervention via the Pad test, in which a sanitary pad is used to measure urinary output. The pad test showed a significant reduction in urinary output in the experimental group after following a pelvic floor muscle exercise program (Ferreira et al.¹⁹ = $-2 + 1.28$, $p < 0.001$, Pires et al.²⁰ = $1.43 + 1.27$ g, $p = 0.025$). Ferreira et al.¹⁹ used a 3 month long pelvic floor exercise program, consisting of exercises at home. Each day, the 16 participants were told to complete sustained and quick pelvic floor contractions in various positions. They performed 30 sustained contractions, and each was followed by 4 quick contractions. Pires et al.²⁰ used a 4-month long

exercises should be administered and monitored by a health care provider trained in pelvic floor interventions. Additionally, by decreasing SUI symptoms, athlete concerns about leakage affecting performance may be alleviated.

of recommendation. We thereby assign a Strength of Recommendation Taxonomy rating of B.²¹

training program. The 7 participants progressed through a 2-week awareness and stabilization program, followed by 2-weeks of strength training. Both components were performed at home. Then, the participants started the 12-week power phase, which was incorporated into their volleyball practice. It should be noted that both studies reported no participant drop out from the treatment intervention when generally only 1/3 or fewer of patients complete a course of treatment.²²⁻²³

While both studies support the use of pelvic floor exercises to decrease SUI symptoms, more research is necessary. These studies only used a small sample of volleyball athletes. Future studies should incorporate participants from other high impact sports, such as gymnastics, ice skating and diving. Additionally, studies should examine if pelvic floor exercises can prevent developing SUI in elite athletes. Ferreria et al.¹⁹ set inclusion criteria of current SUI symptoms, while Pires et al.²⁰ did not, although 71.4% met the criteria for SUI. Groups in both studies benefited immediately following the training intervention, but it is unknown if these exercises reduce the risk of SUI. Future research should consider if these exercises prevent SUI diagnoses, as well as determine when in the season training would be most beneficial to the athletes. Finally, more research is needed to see why there was higher

patient compliance in these populations¹⁹⁻²⁰ compared to other populations.²²⁻²³

Many female athletes cite concerns about SUI during training,^{9, 15, 24} with some even reporting a negative effect on social life and avoiding activities due to SUI symptoms.²⁴ Others report reliance on protective pads and restricting fluid consumption.¹⁵ Healthcare providers for female athletes should be aware of SUI in this group and know that pelvic floor exercises may help athletes experiencing SUI symptoms. Recognition and intervention should

be a collaborative, interprofessional effort. Physicians may diagnose SUI, but they refer out to other providers for treatment. Athletic trainers, often responsible for the day-to-day health care of athletes, are not trained in pelvic floor interventions. Physical therapists with specialization in pelvic floor therapy may be the best provider option to help these patients. All providers should work together to ensure the patient is getting the care they need to address SUI.

Table 2.
Characteristics of Included Studies

Characteristics	Ferreria et al.	Pires et al.
Study Title	Reeducation of pelvic floor muscles in volleyball athletes.	Pelvic floor muscle training in female athletes: A randomized controlled pilot study.
Study Participants	32 Participants. Mean age EG= 19.4, mean BMI= 22.8; Mean age control= 19.1, mean BMI= 21.5.	13 Participants. EG= 7 Mean age EG= 21.83, mean BMI = 21.75; Control= 6, Mean age control= 22.71, mean BMI= 21.37.
Inclusion/Exclusion criteria	Inclusion: nulliparous female volleyball athletes, symptoms of stress UI, age between 13 and 30 years, and amount of urinary leakage greater than 1 g. Exclusion criteria were treatment for less than six months, sport practice for less than two years, repeated urinary infections or at the time of sample selection, body mass index below 18 kg/m ² or above 25 kg/m ² , and PFMRP adherence under 50%	Inclusion: 18 or older, elite female volleyball athletes, nulliparous, able to provide informed consent. Exclusion: inability to perform a correct pelvic floor muscle contraction or inability to insert or maintain the vaginal probe due to pain or discomfort, irregularity of sport performance, surgical treatment of gynecological and urological illnesses, UTI, and pelvic organ prolapse.
Characteristics (cont.)	Ferreria et al. (cont.)	Pires et al. (cont.)
Outcome Measures	Pad test.	Pad test.

Results	Urinary leakage decreased 45.5% in EG, 4.9% in CG; frequency in EG decreased 14.3%, in CG 0.05%.	Pad test EG initial =2.71, final= 1.29;
Evidence Quality Score	10/11(CASP)	10/11 (CASP)
Supports for the answer	yes	yes

CAT Kill Date: July 2027

CATS have a limited life and should be revised approximately 5 years after publication. (see <https://doi.org/10.1123/ijatt.2018-0093>).

Conflicts of Interest

None of the authors reported any conflicts of interest.

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Statement of Contributions

Dr. McMillen was the primary author and conducted the search and wrote and edited the paper. Drs Tierney, Russ, and Mansell contributed to the writing and editing of the final paper and its drafts.

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