

Prevalence Of Pelvic Floor Dysfunction In Female Athletes – Narrative Review

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Abstract

Purpose of the review: This narrative review aims to evaluate the prevalence of pelvic floor dysfunction in female athletes.

Methods: A literature search was conducted in PubMed, PEDro, Cochrane library, and Google Scholar databases using the keywords women, pelvic floor dysfunction, pelvic floor symptoms, urinary incontinence, sports, athletes. randomized controlled trials, observational studies, and systematic reviews were included.

Results: Pelvic floor dysfunction is common in female athletes, and urinary incontinence is the most reported symptom. The urinary incontinence prevalence varies widely, from about 23% to over 60%, this variation is due to the type of sport and duration of sports practice.

Conclusion: Female athletes reported higher prevalence of urinary incontinence than non-athletes, especially in high-impact, elite, or long-term training.

Introduction

The pelvic floor (PF) are the structures that cover the floor of pelvic cavity which include muscles, ligaments, and fascia surrounding the urethra, vagina, and anus (1). that keep pelvic organs stability, maintain continence, aid in micturition and defecation, improve sexual functions, and have a role in childbirth. PF performs those many functions through coordination of the nervous system, proper alignment of ligaments, and fascia, as well as proper contraction and relaxation of pelvic floor muscles (PFM) (2).

Pelvic floor muscles PFM consists of 3 layers the most external layer is the urogenital triangle that contains bulbocavernosus, ischiocavernosus, and external anal sphincter muscles. The second layer is the urogenital diaphragm which made up of superficial and deep transverse perineal muscles, and external urethral sphincter The deep layer is the pelvic diaphragm, which comprises levator ani and coccygeus muscles. The levator ani muscle is made up of three muscles: pubococcygeus, ileococcygeus, and puborectalis (3)

The pelvic floor muscles consist of 66% slow-twitch muscle fibers (type I), and 34% fast-twitch muscle fibers (type II). The slow-twitch fibers are responsible for providing support for the pelvic organs at rest and maintaining the tone of the muscles. The fast-twitch fibers are mainly activated during stressful periods or sudden increases in intraabdominal pressure, such as in coughing, or sneezing, and can maintain contractions for a short time. (4)

Despite some similarities of the pelvic floor muscles PFM between males and, females, there are a difference on anatomy and physiology of PFM between males and females due to the difference in urogenital system and to adapt pregnancy and childbirth in females in addition males have higher muscle tone, maximum voluntary contraction, and muscle endurance. (5)

Pelvic floor dysfunction encompasses a wide range of disorders, symptoms, and diagnosis that relate to disturbance on the pelvic floor anatomy and physiology result on supportive disorders, hypertonus, pain and incoordination. (6)

Key Symptoms of Pelvic Floor Dysfunction are urinary incontinence, pelvic organ prolapse, fecal incontinence, pelvic pain vaginal laxity (VL), and overactive bladder (OAB). (7) The prevalence of pelvic floor dysfunction is underdiagnosed the average reported prevalence worldwide ranges from 1.9% to 46.50%. Pelvic floor symptoms impair quality of life through embarrassment, social isolation, and reduced participation in daily activities. (8)

Methods:

The literature search conducted in June 2024 in the following database Pubmed, PEDro, Cochrane library and Google Scholar databases with the keywords “women”, “pelvic floor dysfunction”, “pelvic floor symptoms”, “urinary incontinence”, “sports”, and “athletes”. observational studies and systematic reviews concerned with the prevalence of pelvic floor dysfunction in female athletes were included.

Results:

14 studies published from 2017 till 2024 were included (9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22). The included studies results show different concerns among the prevalence of pelvic floor dysfunction in female athletes.

The most pelvic floor dysfunction symptoms reported in included studies were urinary incontinence.

3 studies compare the prevalence of urinary incontinence between athletes and control (Almeida 2016) shows that Brazilian athletes had higher UI odds than non-athletes (OR 2.90, 95% CI 1.50-5.61) while Carvalhais, 2017 conclude that elite athletes had 29.6% UI vs 13.4% in controls. Arbierto2021 reported that the prevalence of urinary incontinence in the female athletes was 53.8%, while that for female non athletes was 35.3%.

Studies Almeida, 2016 Hagovská, 2018 Antuña,2022 López,2022also show that the type of sports affect the PFD symptoms. Sports with high impact as trampolining, gymnastics, volleyball, weightlifting, and CrossFit have higher prevalence or odds of PFD symptoms. Winder2023 reported that the prevalence of UI in female professional dancers is similar to that found in other high-level female athletes.

Training exposure assessed in 3 studies Alves2017, Cardoso2018 and López,2022 they found that higher weekly volume, longer sport participation, and longer weekly sporting activity were associated with more urinary leakage.

Some studies reported pelvic floor dysfunction symptoms rather than urinary incontinence as fecal incontinence, pelvic organs prolapse, dyspareunia, pelvic pain, constipation, and sexual dysfunction. (Skaug2020, Winder2023 and Bosch-Donate2024).

Outcomes as seeking treatment and understanding the basic knowledge about pelvic floor were reported in Cardoso 2018, Skaug 2020 and Mahoney 2023. They found that female athletes normalize the symptoms and consider them as a part of sport and their seeking of treatment were rare and their knowledge was often low.

The characteristics of included studies are concluded in table 1 that compares between the included population, the intervention, comparison and outcomes measured (PICO) and the results of each study.

Table (1): Characteristics of included studies

Name	Title	Year of publication	PICO	Results
Almeida2016	Urinary incontinence and other pelvic floor dysfunctions in	2016	P: 67 amateur female athletes vs 96 nonathletes. I: Participation in high-impact/strong-effort sport. C: Nonathletes.	Athletes had higher UI risk (OR 2.90, 95% CI 1.50–5.61), especially gymnastics/trampoline ; prolapse was

	female athletes in Brazil		O: UI and other PFD symptoms.	reported only in nonathletes
Carvalhais2017	Performing high-level sport is strongly associated with urinary incontinence in elite athletes	2018	P: 372 elite female athletes and 372 controls. I: Elite sport participation. C: Age-matched controls. O: UI prevalence and risk factors.	UI prevalence was 29.6% in athletes vs 13.4% in controls; high-level sport was associated with UI (adjusted OR 3.31, 95% CI 2.20–4.97)
Alves2017	Urinary Incontinence in Physically Active Young Women: prevalence and related factors	2017	P: 245 nulliparous fit women. I: High- vs low-impact sport and training volume. C: Lower-impact/lower-volume activity. O: UI prevalence and QoL.	Overall UI prevalence was 22.9%; 60.7% of incontinent women had stress UI. High-impact sport and higher exercise volume were associated with more leakage and worse quality of life
Cardoso2018	Prevalence of urinary incontinence in high-impact sports athletes and association with knowledge, attitude and practice	2018	P: 118 female high-impact athletes. I: High-impact sport exposure; knowledge/attitude/practice factors. C: Within-cohort comparisons. O: UI prevalence, type, predictors.	UI prevalence was 70%; 61% leaked during training and 45% during competition. Sport participation >8 years and dyspareunia increased odds, while adequate knowledge was protective (OR 0.43)
Hagovská2018	Prevalence and risk of sport types to stress urinary incontinence in sportswomen	2018	P: 278 nulliparous sportswomen in high-intensity sports. I: Different sport types. C: Other sports within cohort. O: SUI prevalence, risk, QoL impact.	Highest SUI prevalence was in athletics (23.8%) and volleyball (19.6%); volleyball carried the highest odds of SUI (OR 2.16), and SUI negatively affected quality of life
López2020	Prevalence of urinary incontinence among elite athletes of both sexes	2020	P: 455 female elite athletes within a 754-athlete cohort. I: Elite sport participation. C: Male athletes and sport subgroups. O: UI prevalence, type, severity.	45.1% of female athletes had UI; 59.9% of cases were stress UI, and 22.7% reported leakage during training, often while jumping
Skaug2020	Prevalence of PFD, bother, and risk factors	2020	P: 180 female powerlifters/Olympic weightlifters.	Prevalence in women was 50.0% for UI, 80.0% for AI, and

	in Norwegian powerlifters and Olympic weightlifters		I: Competitive strength sport. C: Within-cohort risk factor analysis. O: UI, AI, POP, knowledge.	23.3% for POP; 87.8% reported negative impact on sport performance
Arbieto2021	Comparison of urinary incontinence between nulliparous female athletes and non-athletes	2021	P: 39 professional female athletes and 34 non-athletes. I: Athletic participation. C: Non-athletes. O: UI, PFM and abdominal strength, endurance.	Athletes had stronger abdominal muscles and stronger maximal PFM contraction, but lower PFM endurance; UI frequency was 53.8% in athletes vs 35.3% in non-athletes, without a significant association for athlete status
Antuña2022	Prevalence of urinary incontinence in female CrossFit athletes: systematic review and meta-analysis	2022	P: 4,823 women across 13 CrossFit studies. I: CrossFit participation. C: Control groups when available. O: UI prevalence, type, risk factors.	Pooled UI prevalence was 44.5%; 81.2% of reported UI was stress UI. Age, BMI, and parity increased likelihood, and jumping exercises were common triggers
López2022	Urinary Incontinence Among Elite Track and Field Athletes According to Event Specialization	2022	P: 211 female elite track and field athletes. I: Event specialization and training characteristics. C: Across event groups. O: UI prevalence, type, severity.	51.7% of female athletes had UI, mostly stress UI; prevalence was lower in vertical jump athletes than in horizontal jump, middle-distance, and sprint/hurdle athletes
Campbell2023	Prevalence of pelvic floor dysfunction in recreational athletes	2023	P: 1,598 adult women, including 1,141 exercisers. I: Recreational exercise. C: Non-exercisers. O: UI, AI, POP symptoms.	UI, AI, and POP prevalence were 70%, 52%, and 18%, but recreational exercise was not significantly associated with PFD after adjustment
Mahoney2023	Prevalence and normalization of stress urinary incontinence in female strength athletes	2023	P: 425 female strength athletes. I: Strength sport participation. C: Within-cohort description. O: SUI prevalence, normalization, treatment seeking.	59.1% leaked during normal strength training and 50.2% during competition; 67.9% considered UI normal in their sport, and only 9.4% had sought treatment

Winder2023	Prevalence of urinary incontinence and other pelvic floor-related symptoms in female professional dancers	2023	P: 208 female professional dancers. I: Professional dance training ≥ 25 h/week. C: None. O: UI and related PFD symptoms.	34.6% reported UI; 54.2% of those with UI leaked with physical activity, and pain with sexual activity was associated with UI
Bosch-Donate2024	Symptomatology and knowledge regarding pelvic floor dysfunctions in female athletes	2024	P: 255 female athletics athletes in Spain. I: Competitive athletics participation; knowledge and stereotypes. C: Within-cohort subgroup comparisons. O: UI, AI, POP, dyspareunia, pelvic pain, knowledge.	Reported symptoms included dyspareunia 63.5%, urine leakage 51.8%, pelvic pain 42.4%, AI 17.3%, and POP 9.0%; knowledge was low for POP, AI, and sexual dysfunction

Summary

Female athletes, especially who participate in high-impact and elite sports, or who have long term sport participation often report high rates of pelvic floor dysfunction mainly urinary incontinence, the most type of UI reported is stress urinary incontinence, and some groups also report rectal prolapse, sexual symptoms and pain. Low awareness of the pelvic floor dysfunction prevention or treatment options was observed in included studies.

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