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Short Article

Pelvic Floor Dysfunction in Athletes: Risk Factors, Prevention, and Rehabilitation – A Narrative Review

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Abstract

Pelvic floor dysfunction (PFD) is increasingly recognized among athletic populations of both sexes, particularly in sports characterized by repetitive high-impact loading, sustained elevations in intra-abdominal pressure, and high training volumes. Clinical manifestations include urinary incontinence, pelvic pain, voiding disturbances, and, less frequently, prolapse-

related symptoms, which may negatively affect performance and quality of life. Although physical activity confers substantial health benefits, sport-specific mechanical and neuromuscular demands may exceed pelvic floor adaptive capacity in susceptible individuals. This narrative review synthesizes contemporary evidence (2020–2025) regarding the epidemiology of PFD in athletes, underlying biomechanical and neuromuscular mechanisms, sport-specific risk factors, and evidence-based strategies for prevention and rehabilitation. Practical implications for screening, training-load management, and multidisciplinary care in athletic populations are discussed.

Keywords: pelvic floor dysfunction; athletes; urinary incontinence; sports medicine; rehabilitation; biomechanics

1. Introduction

Athletic training imposes unique mechanical and neuromuscular demands on the pelvic floor through repetitive impact forces, rapid fluctuations in intra-abdominal pressure, and sport-specific movement patterns. While regular physical activity improves overall health, these demands may exceed pelvic floor adaptive capacity, leading to pelvic floor dysfunction (PFD) in susceptible athletes [1,2]. Historically underrecognized—particularly in male athletes—PFD is now increasingly acknowledged as a clinically relevant condition affecting performance, quality of life, and long-term participation in sport [3].

The aim of this narrative review is to consolidate current evidence regarding the epidemiology, pathophysiological mechanisms, and sport-specific risk factors for PFD in athletes, and to outline practical approaches to prevention and rehabilitation.

2. Materials and Methods

A narrative literature review was conducted using PubMed, Scopus, and Google Scholar. Search terms included *pelvic floor dysfunction*, *urinary incontinence*, *athletes*, *high-impact sports*, *biomechanics*, and *rehabilitation*. Publications from January 2020 to May 2025 were prioritized, including observational studies, randomized controlled trials, systematic reviews, and clinical guidelines. Earlier landmark publications were selectively included to provide mechanistic context. Due to heterogeneity in study designs and outcome measures, findings were synthesized qualitatively.

3. Epidemiology and Sport-Specific Risk Factors

Reported prevalence of PFD varies widely across sports and study methodologies. High-impact disciplines such as gymnastics, volleyball, basketball, athletics, and long-distance running demonstrate particularly high rates of stress urinary incontinence, especially among female athletes [3–5]. Endurance sports characterized by prolonged loading and fatigue may further predispose athletes to symptoms.

In male athletes, cycling and heavy resistance training have been associated with irritative and voiding symptoms, although prevalence data remain limited [6]. Identified risk factors include rapid increases in training load, insufficient recovery, poor lumbopelvic control, and inadequate integration of pelvic floor strategies within strength and conditioning programs [7].

4. Pathophysiological Mechanisms Linking Sport and PFD

4.1 Biomechanical Load and Impact Forces

Ground-reaction forces and abrupt deceleration during jumping and sprinting generate transient spikes in intra-abdominal pressure. When these exceed pelvic floor support capacity, repetitive strain may impair muscle timing and endurance, reducing urethral support during dynamic tasks [8,9].

4.2 Neuromuscular Coordination

Effective continence relies on anticipatory pelvic floor activation coordinated with trunk and limb movements. Fatigue, altered motor patterns, and suboptimal breathing mechanics can disrupt this coordination, increasing leakage risk during sport-specific actions [10].

4.3 Sex-Specific and Hormonal Influences

In women, connective tissue properties influenced by hormonal status may modulate pelvic floor resilience under mechanical load. In men, sport-specific loading patterns differ, with prolonged perineal pressure (e.g., cycling) contributing to symptom development [6,11].

Sex- and sport-specific risk factors for PFD are summarized in **Table 1**.

Table 1. Sport-specific risk factors for pelvic floor dysfunction in athletes

Sport type	Population	Main risk factors	Typical manifestations	References
High-impact sports (gymnastics, volleyball, running)	Female athletes	Repetitive impact, fatigue	Stress urinary incontinence	[3–5,8]
Endurance sports	Both sexes	Prolonged loading, fatigue	Leakage, urgency	[7,9]
Resistance training	Both sexes	High intra-abdominal pressure	Transient leakage	[8,12]
Cycling	Male athletes	Perineal pressure	Voiding symptoms	[6,11]

5. Prevention Strategies

Preventive approaches should be embedded within routine athletic training. Pelvic floor–aware training integrates pelvic floor muscle training (PFMT) with functional movements and sport-specific drills. Load management strategies emphasize gradual progression, adequate recovery, and periodization. Coordinated diaphragmatic breathing and trunk stability are essential to

optimize pressure management [10,12]. Routine screening and athlete education facilitate early identification of symptoms.

6. Rehabilitation Approaches

Rehabilitation should be individualized and guided by symptom presentation and sport demands. Interventions may include PFMT emphasizing timing and endurance, neuromuscular retraining, biofeedback, and graded return-to-impact protocols. Multidisciplinary collaboration among physiotherapists, sports physicians, and coaches enhances outcomes and supports safe return to sport. Key prevention and rehabilitation strategies are summarized in **Table 2**.

Table 2. Prevention and rehabilitation strategies for pelvic floor dysfunction in athletes

Strategy	Key components	Clinical application	References
PFMT	Strength, endurance, timing	First-line intervention	[1,12,13]
Load management	Gradual progression, recovery	Symptom prevention	[7,14]
Breathing/core control	Diaphragmatic breathing	Pressure regulation	[10]
Multidisciplinary care	Physio, physician, coach	Return to sport	[3,15]

7. Discussion

Current evidence indicates that PFD in athletes is largely modifiable. The balance between mechanical load and neuromuscular adaptation appears central to symptom development. Embedding preventive strategies within training programs may reduce incidence and

recurrence. Greater inclusion of male athletes and standardized outcome measures are required to advance research in this field.

8. Limitations and Future Directions

Evidence is limited by heterogeneous definitions of PFD, reliance on self-reported outcomes, and underrepresentation of male and elite athletes. High-quality longitudinal studies are needed to clarify causal relationships and optimize intervention strategies.

9. Conclusions

Pelvic floor dysfunction represents a relevant yet modifiable condition in athletic populations. Integrating pelvic floor–aware principles into training, prevention, and rehabilitation may mitigate symptoms, support performance, and enhance athlete well-being.

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