



Physiotherapy for Pelvic Dysfunction: A Comprehensive Review

Pelvik Disfonksiyonda Fizyoterapi: Kapsamlı Bir İnceleme

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ABSTRACT

Pelvic floor dysfunction (PFD) includes a range of disorders such as urinary and fecal incontinence, pelvic organ prolapse, pelvic pain, and sexual dysfunction. These conditions affect millions globally, often leading to decreased quality of life. Physiotherapy has emerged as a first-line, non-invasive treatment with growing clinical support. To synthesize current evidence (2014-2024) regarding physiotherapy-based interventions for the treatment and prevention of PFD in general and special populations. A narrative literature review was conducted using peer-reviewed articles, randomized controlled trials, systematic reviews, and clinical guidelines. Interventions assessed include pelvic floor muscle training (PFMT), biofeedback, electrical stimulation, manual therapy, behavioral modification, and telerehabilitation. PFMT remains the most effective and widely recommended intervention, particularly for stress urinary incontinence and mild pelvic organ prolapse. Biofeedback enhances motor control and adherence, especially in older adults or postpartum women. Electrical stimulation benefits patients with poor voluntary contraction capacity. Manual therapy is effective in cases of pelvic pain associated with hypertonic muscle activity. Behavioral strategies, including bladder training and toileting education, further optimize outcomes. Emerging evidence supports the use of app-based PFMT and digital tools, though engagement varies. Physiotherapy shows positive outcomes in special populations including postpartum, postmenopausal, and post-prostatectomy patients. Physiotherapy offers an evidence-based, individualized approach for managing PFD across a range of populations. Continued research, broader

ÖZ

Pelvik taban disfonksiyonu (PTD), idrar ve gaita inkontinansı, pelvik organ sarkması, pelvik ağrı ve cinsel işlev bozukluğu gibi çeşitli rahatsızlıkları kapsar. Bu durumlar dünya genelinde milyonlarca kişiyi etkilemekte ve sıklıkla yaşam kalitesinde azalmaya yol açmaktadır. Fizyoterapi, giderek artan klinik kanıtlarla desteklenen, invaziv olmayan bir birinci basamak tedavi seçeneği olarak öne çıkmaktadır. Bu derleme çalışmasının amacı, 2014-2024 yılları arasında yayımlanan güncel literatürü temel alarak, genel ve özel popülasyonlarda PTD'nin tedavi ve önlenmesinde kullanılan fizyoterapi temelli yaklaşımları ortaya koymaktır. Bu amaçla anlatı türünde bir literatür taraması gerçekleştirilmiş; hakemli makaleler, randomize kontrollü çalışmalar, sistematik derlemeler ve klinik kılavuzlar incelenmiştir. Değerlendirilen müdahaleler arasında pelvik taban kas eğitimi (PFME), biyogeribildirim, elektrik stimülasyonu, manuel terapi, davranışsal değişim yaklaşımları ve telerehabilitasyon yer almaktadır. PFME, özellikle stres tip idrar kaçırma ve hafif pelvik organ sarkması durumlarında en etkili ve en çok önerilen müdahale olarak öne çıkmaktadır. Biyogeribildirim, motor kontrolü ve egzersiz uyumu artırmakta; özellikle yaşlı bireylerde ve doğum sonrası kadınlarda faydalı olmaktadır. Elektrik stimülasyonu, istemli kas kasılımı zayıf olan hastalarda olumlu sonuçlar vermektedir. Manuel terapi, hipertonic kas aktivitesine bağlı pelvik ağrı olgularında etkili bulunmuştur. Mesane eğitimi ve tuvalet alışkanlıkları eğitimi gibi davranışsal stratejiler, tedavi sonuçlarını daha da iyileştirmektedir. Mobil uygulamalarla yürütülen PFME ve dijital araçlara yönelik kanıtlar giderek artmaktadır; ancak kullanıcı katılımı değişkenlik

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ABSTRACT

access to trained professionals, and integration of digital technologies are essential to improve treatment reach and long-term outcomes.

Keywords: Pelvic floor dysfunction, physiotherapy, pelvic floor muscle training, urinary incontinence, chronic pelvic pain

ÖZ

göstermektedir. Fizyoterapi, doğum sonrası, menopoz sonrası ve prostatektomi sonrası bireyler gibi özel popülasyonlarda da olumlu sonuçlar sağlamaktadır. Sonuç olarak, fizyoterapi PTD'nin yönetiminde kanıta dayalı ve bireyselleştirilmiş bir yaklaşım sunmaktadır. Tedaviye erişimin artırılması, uzman fizyoterapistlerin yaygınlaştırılması ve dijital teknolojilerin entegrasyonu, uzun vadeli sonuçların iyileştirilmesi açısından büyük önem taşımaktadır.

Anahtar Kelimeler: Pelvik taban disfonksiyonu, fizyoterapi, pelvik taban kas eğitimi, idrar kaçırma, kronik pelvik ağrı

Introduction

Pelvic floor dysfunction (PFD) is characterized by symptoms such as urinary and fecal incontinence, pelvic organ prolapse (POP), sexual dysfunction, and pelvic pain, which result from impairments in the function of pelvic muscles and connective tissues. Globally, PFD affects an estimated 25-45% of adult women, with prevalence varying by geography and socioeconomic status. Studies from low- and middle-income countries in Asia and Africa have reported comparable or even higher rates of urinary incontinence and pelvic pain compared to Western populations, underscoring the global burden of the disorder and the need for region-specific preventive strategies (1,2). A study conducted in Spain between 2021 and 2022 reported that more than half of the participating women experienced urinary incontinence, while 10.4% reported fecal incontinence, 14% had POP, and 18.7% reported pelvic pain. The study identified several risk factors associated with the development of PFD, including advanced age, gastrointestinal diseases, vaginal delivery, and instrumental birth (3,4). While historically underdiagnosed and undertreated, growing awareness of pelvic health has prompted significant interest in conservative management approaches, particularly physiotherapy.

The pelvic floor comprises a complex network of skeletal muscles, fascia, and ligaments, functioning collectively to support the pelvic organs, maintain continence, and contribute to lumbopelvic stability. Dysfunction may arise due to childbirth trauma, vaginal childbirth, aging, hormonal changes, surgery, obesity, high-impact sports, or chronic straining from constipation (5). However, PFD is not exclusive to women. Men may also experience PFD due to factors such as chronic prostatitis/chronic pelvic pain syndrome (CP/CPPS), sedentary lifestyle, obesity, excessive straining, and high-stress occupations in addition to post-prostatectomy incontinence (6).

Epidemiological studies estimate that nearly one in four adult women in the United States experiences at least one PFD, with prevalence increasing sharply after menopause (3). In contrast, data from regions such as sub-Saharan Africa and Southeast Asia remain limited, yet emerging

community-based surveys indicate that cultural stigma, limited access to physiotherapy, and lack of health education contribute to underdiagnosis and late presentation. These findings show the importance of global awareness and resource-adapted physiotherapy strategies.

Physiotherapy has emerged as the cornerstone of non-surgical intervention for PFD. Pelvic floor muscle training (PFMT), based on repetitive voluntary contractions of the PFMs, is recognized as a first-line treatment for various presentations, including stress urinary incontinence (SUI) and POP (7). Adjunct interventions such as biofeedback, electrical stimulation (ES), and bladder training enhance the effectiveness of PFMT. Through these approaches, healthcare professionals including physicians, physiotherapists, and midwives contribute to improvements in quality of life and reductions in symptoms (8,9). The mechanisms through which physiotherapy exerts benefit include neuromuscular re-education, increased muscle tone and endurance, and improved sensorimotor integration.

In recent years, robust evidence from randomized controlled trials and systematic reviews has confirmed the efficacy of physiotherapy in treating PFD. A Cochrane review encompassing over 30 trials demonstrated that women undergoing supervised PFMT were eight times more likely to report symptom improvement compared to controls (10). Another meta-analysis emphasized the cost-effectiveness of early physiotherapy intervention in preventing surgical management for SUI and POP (11). Moreover, newer approaches incorporating biofeedback and digital health platforms have shown promise in improving patient adherence and engagement, particularly in underserved populations (12). International clinical guidelines, including those from the International Continence Society, the European Association of Urology, and the American College of Obstetricians and Gynecologists, consistently recommend PFMT as the first-line conservative management for PFD.

Despite these advances, challenges remain. Many clinicians lack standardized training in pelvic health rehabilitation, and access to specialized physiotherapy services varies

by region. Therefore, a personalized, multidisciplinary approach grounded in patient education, structured assessment, and evidence-based protocols is essential to optimize outcomes in this complex population. This review aims to synthesize recent evidence (2014-2024) on physiotherapy interventions for pelvic dysfunction. We discuss the pathophysiology and classification of PFD, present a detailed overview of physiotherapeutic techniques, and evaluate clinical outcomes across various subgroups, including postpartum women, menopausal individuals, and male patients. By consolidating current knowledge, we hope to guide clinical practice and inform future research directions in pelvic floor rehabilitation.

The pelvic floor is a multilayered structure composed of skeletal muscles, ligaments, fascia, and neurovascular elements that support the pelvic organs and contribute to urinary and fecal continence, sexual function, and lumbopelvic stability (5). The primary muscular layer, the pelvic diaphragm, consists of the levator ani group—pubococcygeus, iliococcygeus, and puborectalis—and the coccygeus muscle. These muscles work synergistically with the abdominal wall and diaphragm to regulate intra-abdominal pressure and maintain core stability (13). Integrity of the pelvic floor can be compromised by vaginal delivery, hormonal changes, aging, obesity, or chronic increases in intra-abdominal pressure, leading to dysfunctions such as incontinence or prolapse (14). Decreased estrogen after menopause contributes to connective tissue weakening and muscle atrophy, which explains the rising prevalence of PFD with age. In summary, the pelvic floor is a biomechanically and neurologically complex system essential for urogenital and gastrointestinal health. Any disruption to its muscular, fascial, or neural components can result in dysfunction, emphasizing the need for physiotherapeutic interventions grounded in sound anatomical understanding.

PFD represents a heterogeneous group of disorders characterized by the inability of the pelvic floor muscles and connective tissue structures to perform their supportive and sphincteric roles adequately. The classification of PFD has evolved alongside advancements in imaging, diagnostics, and clinical assessment tools, enabling more precise identification of distinct phenotypes. Broadly, PFD can be categorized into three primary functional disturbances: underactive pelvic floor, overactive pelvic floor, and pelvic floor support defects (15).

Underactive PFD, the most commonly recognized subtype, is characterized by insufficient contraction strength or endurance of the pelvic floor muscles. It often manifests clinically as SUI, fecal incontinence, or POP. The pathogenesis of underactive PFD is frequently linked to mechanical trauma to the levator ani muscles or pudendal nerve, most commonly during vaginal childbirth (14).

Conversely, overactive PFD is characterized by increased resting tone or failure of the pelvic floor muscles to relax

appropriately. This condition is frequently associated with CPPSs, including dyspareunia, vulvodynia, and interstitial cystitis/bladder pain syndrome. Patients may present with urinary urgency, hesitancy, or incomplete voiding, often mistaken for urological pathology. Etiological factors include psychological stress, a history of sexual trauma, and central sensitization processes, wherein heightened nociceptive signaling alters pain perception and muscular tone (16). Electromyographic studies and palpation-based assessments frequently reveal myofascial trigger points and hypertonicity in affected individuals (17).

The third category, pelvic floor support defects, encompasses structural impairments such as cystocele, rectocele, enterocele, and uterine or vault prolapse. These are most commonly observed in women who have experienced vaginal childbirth but also occur following hysterectomy or pelvic surgery. Disruption or attenuation of the endopelvic fascia, uterosacral ligaments, or arcus tendinous fascia pelvis plays a central role in the pathophysiology of these conditions (18). Risk increases significantly with age, obesity, chronic coughing, connective tissue disorders such as Ehlers-Danlos syndrome, and occupational or lifestyle factors involving heavy lifting (19).

In both women and men, PFD may also be secondary to iatrogenic causes. Radical pelvic surgeries, including prostatectomy, hysterectomy, or bowel resection, frequently disrupt pelvic nerve pathways and impair muscular coordination. In men, the prevalence of post-prostatectomy urinary incontinence remains a significant concern, often linked to sphincter insufficiency or denervation of pelvic floor musculature (20).

Another increasingly recognized contributor to PFD is behavioral and postural dysfunction. Improper toileting behavior (e.g., habitual straining or delayed voiding), prolonged sitting, and poor core stabilization contribute to altered pelvic biomechanics, muscular imbalance, and neuromuscular discoordination (21). Moreover, psychosocial stress and anxiety disorders have been linked to increased pelvic floor muscle tone and dysregulation of the autonomic nervous system, further complicating the clinical picture (22).

In summary, PFD arises from an interplay of biomechanical, neurological, hormonal, and psychosocial factors. Its heterogeneity necessitates a thorough understanding of the underlying etiology to inform diagnosis and direct appropriate conservative treatment. Physiotherapy, as a frontline intervention, must be adapted to address the specific dysfunction subtype—whether hypotonus, hypertonus, or structural insufficiency—thereby ensuring optimal patient-centered care.

Clinical and Research Consequences

Although this review is narrative in nature, a structured literature search was conducted to ensure methodological

transparency. PubMed, Scopus, Web of Science, and Google Scholar were searched for articles published between January 2014 and December 2024 using the following keywords: “pelvic floor dysfunction”, “pelvic physiotherapy”, “pelvic floor muscle training”, “urinary incontinence”, “pelvic pain”. Studies were included if they: (1) involved adult populations; (2) evaluated physiotherapy interventions; and (3) were clinical trials, systematic reviews, meta-analyses or clinical guidelines. Non-English papers, case reports, pediatric-only studies, and articles without full text were excluded. Reference lists of relevant studies and guideline documents were additionally screened to identify further sources.

PFD encompasses a wide range of conditions that affect the function of the pelvic floor musculature and connective tissues, leading to symptoms such as urinary incontinence, POP, sexual dysfunction, and chronic pelvic pain. Physiotherapy plays a central role in the conservative management of these conditions by offering a set of tailored interventions that target muscular performance, neuromuscular control, tissue mobility, and behavioral habits. The diversity in pathophysiology across PFD subtypes necessitates a multifaceted treatment approach that often combines several physiotherapy modalities (15).

PFMT remains the gold standard for conservative management of hypotonic PFDs, particularly SUI and POP. PFMT consists of the voluntary contraction and relaxation of pelvic floor muscles with the aim of improving their strength, endurance, and coordination. A high-quality Cochrane review by Dumoulin et al. (7) showed that women who received PFMT were significantly more likely to report improvement in symptoms and quality of life compared to no treatment. In another meta-analysis, Wang et al. (11) demonstrated that PFMT also had a preventive effect on the progression of POP in women over a 12-month period. However, the majority of trials have evaluated outcomes only up to 6-12 months, and there remains a critical lack of evidence on the durability of PFMT benefits beyond this timeframe. Long-term follow-up studies (≥ 3 years) are urgently needed to determine whether improvements in continence, pelvic support, and pain control are sustained.

Another key limitation involves the wide heterogeneity in PFMT protocols across studies. Differences in training frequency (ranging from 1-3 sessions per week), intensity (maximal versus submaximal contractions), supervision levels (home-based versus supervised), and duration (4-24 weeks) make it difficult to establish universal clinical guidelines. This methodological variability highlights the need for standardized, evidence-based protocols to improve reproducibility and guide international recommendations (Table 1).

In cases of severe muscular weakness or partial denervation, ES can be utilized to initiate passive muscle contractions. ES delivers low-frequency impulses via vaginal or anal probes,

which activate motor units and improve recruitment of pelvic floor fibers. This modality is particularly useful in postpartum rehabilitation, post-surgical recovery, and for patients with neurogenic bladder. Lunardi et al. (23) demonstrated that ES combined with PFMT significantly improved continence outcomes in women with SUI compared to PFMT alone. Sarmiento et al. (24), emphasized its utility as a transitional tool for patients who were unable to generate sufficient voluntary contractions. A systematic review and meta-analysis by Chen et al. (25) also found benefits in early ES use following radical prostatectomy, contributing to faster return to continence.

For individuals presenting with overactive or hypertonic pelvic floor muscles—often manifesting as pelvic pain, vaginismus, or dyspareunia—manual therapy becomes a cornerstone of treatment. This includes techniques such as myofascial release, trigger point therapy, connective tissue mobilization, and neural gliding, applied either internally (via vaginal or rectal access) or externally. These methods aim to reduce muscle tone, desensitize painful tissue, and improve blood flow and mobility. Frederice et al. (17) reported that a series of manual therapy sessions significantly reduced pain severity and improved pelvic floor relaxation in women with vulvar pain syndromes. Murad-Regadas et al. (26) found similar results in patients with levator ani syndrome, with improvements in muscle tone and rectal pressure profiles. Moreover, Bittelbrunn et al. (27) showed the effectiveness of combining manual therapy with relaxation techniques in women suffering from chronic pelvic pain, showing over 70% reduction in symptom scores. Nevertheless, the evidence base for manual therapy is limited by small sample sizes, short intervention durations, and heterogeneous methodologies. Few randomized controlled trials compare manual therapy directly with other physiotherapy modalities, underscoring the need for large-scale, standardized trials to confirm its efficacy and optimize treatment protocols.

In addition to active and passive muscle-based approaches, behavioral therapies and bladder retraining protocols play a crucial role, particularly for patients with urge urinary incontinence, frequency, or dysfunctional voiding. These interventions involve educating the patient about optimal voiding habits, fluid intake, and urgency suppression strategies. Huang et al. (28) demonstrated that structured bladder training combined with PFMT resulted in significantly better symptom control than either intervention alone in older women. Similarly, Booth et al. (29), emphasized the benefit of bladder diaries and scheduled voiding in improving adherence and empowering patients to manage their symptoms independently. Bladder retraining is also essential in reducing detrusor overactivity and promoting central nervous system habituation.

Technological advancements have allowed pelvic floor physiotherapy to evolve beyond the clinic. Telerehabilitation and mobile app-based PFMT programs offer guided

exercise plans, symptom tracking, and remote therapist consultations. These platforms increase accessibility, particularly for patients in rural areas or those with mobility limitations. de Araujo et al. (12) conducted a randomized controlled trial comparing supervised physiotherapy to app-based PFMT and found no significant difference in outcomes after 12 weeks of training, though adherence was higher in the supervised group. Woodley et al. (30) reviewed digital health tools and concluded that mobile applications could be effective, especially when combined with periodic therapist feedback. Furthermore, Harper et al. (31) suggested that gamification and reminder systems embedded in apps enhanced user engagement and long-term compliance. However, real-world implementation of digital physiotherapy is often limited by barriers such as adherence variability, data privacy concerns, limited digital literacy among older adults, and inconsistent internet access in low-resource settings. Hybrid care models that combine in-person supervision with digital support may represent the most effective strategy for optimizing engagement and clinical outcomes.

A particularly promising direction in recent years has been the use of multimodal physiotherapy, where several interventions are combined based on patient presentation. For example, a 2018 prospective cohort study by Allaire et al. (32) demonstrated that a tailored program incorporating PFMT, manual therapy, cognitive-behavioral strategies, and mindfulness reduced chronic pelvic pain and improved sexual function in women over 12 weeks. Multimodal approaches reflect the growing recognition that PFD is a biopsychosocial condition, requiring interventions that address both physical and psychological dimensions of care (33,34).

Taken together, the physiotherapy management of PFD is grounded in a diverse arsenal of methods, each supported by clinical evidence and tailored to the functional status and goals of the patient. A successful rehabilitation program not only restores physical function but also improves self-efficacy, mental well-being, and quality of life. Table 2 summarizes the major evidence-based physiotherapy interventions and their clinical outcomes in PFD.

PFD affects diverse populations across the lifespan, and the approach to physiotherapy must be tailored to the specific physiological, anatomical, and psychosocial needs of each subgroup. Among the most clinically relevant populations are pregnant and postpartum women, peri- and postmenopausal women, and men, particularly those undergoing urological surgeries. Each group presents unique challenges and requires targeted assessment and intervention strategies supported by evolving clinical evidence. Emerging research also highlights the importance of early screening and preventive physiotherapy programs to minimize symptom progression in high-risk individuals.

Pregnant and postpartum women represent a high-risk population for the development of pelvic floor disorders due to mechanical, hormonal, and neuromuscular changes during pregnancy and childbirth. Increased intra-abdominal pressure, weight gain, and the effects of relaxing on connective tissue contribute to pelvic floor weakening, often leading to SUI and POP. Vaginal delivery, especially with prolonged labor, instrumental assistance, or perineal trauma, significantly increases the risk of levator ani avulsion and pudendal nerve injury. Several randomized controlled trials have demonstrated the preventive and therapeutic effects of antenatal and postnatal PFMT. A more recent meta-analysis by Woodley et al. (35) confirmed that postnatal PFMT significantly improved continence and pelvic muscle function, particularly when started within the first six weeks after delivery. Yet, data beyond one year postpartum remain scarce, highlighting the need for long-term follow-up to assess maintenance of muscle strength and continence outcomes.

Menopausal and postmenopausal women represent another population commonly affected by PFD, largely due to estrogen deficiency and connective tissue remodeling that accompany the hormonal changes of menopause. Decreased estrogen levels result in atrophy of the pelvic floor musculature and urogenital mucosa, leading to symptoms such as urge incontinence, vaginal dryness, POP, and sexual dysfunction. Physiotherapy in this population emphasizes not only PFMT but also strategies aimed at improving tissue elasticity, postural alignment, and pelvic

Table 1. Summary of pelvic floor muscle training (PFMT) protocol variations across studies

Author (year)	Frequency	Contraction parameters	Supervision type	Program duration
Dumoulin et al. (7) (2018)	3×/day	8-10 sec maximal contraction+relaxation	Supervised+home program	12 weeks
Woodley et al. (35) (2020)	Daily	5-8 sec contraction, 6-10 reps	Home-based	8-12 weeks
Wang et al. (11) (2022)	3 sessions/week	Progressive intensity	Supervised physiotherapy	16 weeks
Cacciari et al. (36) (2019)	2-3×/day	Slow (6-8 sec)+fast (1-2 sec) contractions	Mixed (clinic+home)	12 weeks
de Araujo et al. (12) (2024)	App-based daily program	Moderate-intensity contractions	Remote/digital	8-12 weeks
Starzec-Proserpio et al. (37) (2024)	2×/day	PFMT+relaxation/diaphragmatic breathing	Supervised multimodal	8 weeks
Chen et al. (25) (2024)	Daily	PFMT+electrical stimulation (for weak muscles)	Clinic-based	12 weeks

Table 2. Overview of evidence-based physiotherapy approaches in pelvic floor disorders

Intervention	Target PFD type	Clinical benefits	Key evidence
Pelvic floor muscle training (PFMT)	Stress urinary incontinence (SUI), pelvic organ prolapse (POP), postpartum dysfunction	Improves muscle strength, continence, and pelvic support; prevents POP progression	Dumoulin et al. (7), Wang et al. (11), Woodley et al. (35), Cacciari et al. (36)
Biofeedback training	SUI, postpartum, elderly	Enhances muscle awareness, control, and adherence to exercise programs	Nunes et al. (8), Leonardo et al. (9), Herderschee et al. (34), Ibrahim et al. (33)
Electrical stimulation	Neurogenic bladder, post-prostatectomy incontinence, severe weakness	Facilitates contraction in denervated muscles; accelerates continence recovery	Lunardi et al. (23), Sarmento et al. (24), Chen et al. (25), Johnson et al. (20)
Manual therapy	Chronic pelvic pain, hypertonic pelvic floor, vaginismus	Reduces trigger points, muscle tone, and pain; improves mobility and relaxation	Frederice et al. (17), Murad-Regadas et al. (26), Bittelbrunn et al. (27), Starzec-Proserpio et al. (37)
Behavioral therapy/bladder retraining	Urge UI, functional UI, frequency syndromes	Improves bladder control, reduces urgency and leakage; promotes adherence	Booth et al. (29), Huang et al. (28)
App-based and digital PFMT/telerehabilitation	Postpartum UI, elderly, rural or underserved populations	Expands access, supports adherence, and enables remote supervision	de Araujo et al. (12), Woodley et al. (30), Harper et al. (31)
Multimodal physiotherapy	Mixed-type dysfunctions, chronic pelvic pain	Integrates PFMT, manual therapy, mindfulness, and cognitive-behavioral methods for holistic outcomes	Allaire et al. (32), Bittelbrunn et al. (27), Starzec-Proserpio et al. (37)

PFD: Pelvic floor dysfunction

support mechanisms. Cacciari et al. (36) demonstrated that PFMT remains effective in postmenopausal women, particularly when delivered in a structured, supervised setting. Combining PFMT with hormone replacement therapy or topical estrogen may further enhance outcomes, though this warrants rigorous controlled trials.

Men with PFD constitute an increasingly recognized group, particularly in the context of post-prostatectomy incontinence and CPPS. Radical prostatectomy often results in partial denervation and weakening of the external urethral sphincter and pelvic floor, leading to significant urinary incontinence and reduced quality of life. Early initiation of PFMT—often combined with biofeedback or ES—has been shown to improve recovery of continence. Chen et al. (25) confirmed these findings in a randomized controlled trial, noting that men receiving physiotherapy interventions had significantly higher continence rates at 12 weeks post-op. However, evidence for the long-term (>1 year) effectiveness of physiotherapy in post-prostatectomy incontinence remains limited, and further studies are warranted. In addition to surgical recovery, men with CP/CPPS often present with hypertonic pelvic floor muscles. In such cases, physiotherapy focuses on manual therapy, down-training techniques, neuromuscular re-education, and lifestyle modifications. Starzec-Proserpio et al. (37) reported that 8 weeks of multimodal physiotherapy—

including manual therapy and breathing coordination—significantly reduced pain and urinary symptoms in men with CP/CPPS. These findings suggest that integrating physiotherapy into urological care pathways can improve holistic outcomes and patient satisfaction.

In addition to these primary populations, physiotherapists must also consider special cases such as athletes, transgender individuals, and those with connective tissue disorders such as Ehlers-Danlos syndrome. Athletes, especially those in high-impact sports, may experience PFD due to repetitive increases in intra-abdominal pressure. Culleton-Quinn et al. (38) highlighted that even asymptomatic athletes often show signs of pelvic floor overactivity, which can lead to pain, leakage, or prolapse later in life if unaddressed. Similarly, early evidence indicates that gender-affirming surgeries and hormone therapies may alter pelvic floor muscle function in transgender individuals, necessitating inclusive and specialized rehabilitation protocols.

Taken together, special populations affected by PFD demand a nuanced and evidence-informed physiotherapy approach. Factors such as age, hormonal status, type of delivery or surgery, comorbidities, and psychological readiness must be integrated into treatment planning. Ongoing research and clinical innovation continue to refine best practices in this field, with an increasing emphasis on

interdisciplinary collaboration and long-term management strategies. This evolving evidence base supports a shift from short-term symptom management toward sustained, preventive, and integrative models of pelvic health care.

The body of evidence reviewed in this article clearly affirms the role of physiotherapy as an effective, first-line intervention for a wide spectrum of PFD. PFMT, biofeedback, ES, manual therapy, and behavioral retraining are all supported by randomized controlled trials and systematic reviews that demonstrate improvements in continence, pain, quality of life, and functional outcomes across varied populations. However, the success of these interventions is heavily contingent on accurate diagnosis, individualized treatment plans, and patient adherence. Moreover, the sustainability of these improvements beyond one year remains uncertain, underscoring the need for longitudinal research to determine relapse rates, maintenance strategies, and cost-effectiveness over time.

While PFMT remains the cornerstone of conservative PFD management, the variability in training protocols, intensity, supervision, and outcome measures across studies presents challenges in establishing universal clinical guidelines. Dumoulin et al. (7) emphasized that supervised PFMT yielded superior results compared to unsupervised programs, yet access to trained pelvic health physiotherapists remains limited in many regions. Additionally, standardization of assessment tools, such as the PERFECT scheme or digital palpation scales, is inconsistent in clinical practice, which may hinder effective monitoring of patient progress and inter-study comparison. Future guideline development should focus on establishing minimum training standards, defining measurable outcome indicators, and encouraging multicenter collaborations to harmonize methodologies.

The integration of biofeedback and ES has expanded therapeutic possibilities, particularly for patients with poor proprioception or neuromuscular impairments. Nonetheless, some studies report marginal gains over PFMT alone, suggesting that these modalities may be most beneficial for specific subgroups rather than universally necessary (23,33). Cost-effectiveness, availability of equipment, and patient acceptability must also be considered when selecting adjunct interventions. Moreover, further high-quality studies are needed to elucidate long-term effects and optimal dosage parameters of electrotherapy in various PFD phenotypes. In this regard, future clinical trials should prioritize comparative effectiveness and pragmatic study designs that reflect real-world practice.

Manual therapy and down-training techniques have proven valuable for patients with pelvic floor overactivity and CPPSs. However, methodological heterogeneity in clinical trials, including varied treatment durations and therapist skill levels, limits generalizability. Frederice et al. (17) and Murad-Regadas et al. (26) provide strong evidence for the

role of internal myofascial release and trigger point therapy in symptom reduction, yet few large-scale randomized controlled trials have explored their comparative effectiveness or established standardized protocols. The biopsychosocial model, which incorporates psychological and behavioral dimensions into physiotherapy care, remains underutilized despite its growing support in chronic pain management literature. Incorporating this multidimensional framework into physiotherapy education and practice may improve both patient outcomes and clinician competency in complex pelvic pain syndromes.

Emerging technologies, particularly telehealth and mobile applications, offer promising avenues for expanding access to pelvic floor rehabilitation. However, while trials such as de Araujo et al. (12) confirm their clinical effectiveness, dropout rates and adherence challenges indicate that digital tools may not be suitable for all patients without additional therapist interaction. These findings highlight the need for hybrid models that combine in-person and digital care to meet diverse patient needs. Additionally, concerns remain regarding data privacy, accessibility among older populations, and the lack of personalized feedback in app-based programs. Regulatory frameworks should therefore ensure that telehealth platforms meet safety, confidentiality, and usability standards, while public health initiatives can promote digital literacy and equitable access.

Another critical aspect of this discussion lies in the management of special populations. Pregnant, postpartum, postmenopausal, and post-prostatectomy patients all require condition-specific modifications to physiotherapy protocols. While PFMT has proven effective across these subgroups, nuances such as hormonal status, surgical recovery timelines, and connective tissue integrity must guide intervention design (25,35). Furthermore, the needs of transgender individuals and those with rare connective tissue disorders remain significantly underrepresented in clinical trials. Addressing these gaps will require inclusive research designs, culturally competent care frameworks, and interdisciplinary collaboration between physiotherapists, gynecologists, urologists, and mental health professionals. Expanding participation of underrepresented groups in clinical trials will be essential to improve the external validity and global relevance of physiotherapy recommendations.

Despite the wealth of supportive data, barriers to implementation persist. Many healthcare systems lack reimbursement pathways for physiotherapy services related to pelvic health, contributing to underutilization and disparities in access. A study by Slade et al. (39) identified inadequate training during professional education and insufficient public awareness as additional obstacles to timely diagnosis and intervention. Addressing these systemic issues will be critical in optimizing population-level outcomes. From a policy perspective, national health

authorities should prioritize pelvic floor physiotherapy as a core component of preventive and rehabilitative healthcare. Structured postgraduate certification programs, continuing education opportunities, and inclusion of pelvic health modules in undergraduate physiotherapy curricula are necessary to standardize practice. Furthermore, establishing reimbursement mechanisms for conservative management could enhance accessibility and reduce the economic burden of surgical interventions.

Conclusion

In conclusion, physiotherapy offers a robust, evidence-based solution to PFD across diverse patient populations. The field continues to evolve with advances in clinical practice, technology, and interdisciplinary care. However, the translation of this evidence into sustainable health outcomes will depend on long-term data collection, policy integration, and equitable access. Future priorities should include (1) development of standardized PFMT and multimodal protocols; (2) creation of multidisciplinary pelvic health centers; (3) investment in telehealth infrastructure and digital literacy; and (4) implementation of national reimbursement frameworks. By aligning research, clinical training, and policy, physiotherapy can play a transformative role in improving global pelvic health and quality of life.

PFD is a prevalent condition that significantly impacts quality of life yet remains underdiagnosed and undertreated. Physiotherapy—including PFMT, biofeedback, ES, manual therapy, and behavioral strategies—offers a safe, effective, and evidence-based first-line approach across a range of PFD presentations.

When tailored to individual needs and delivered with clinical expertise, physiotherapy has demonstrated strong outcomes in improving continence, reducing pain, and enhancing functional quality of life in both women and men. Longitudinal evidence also suggests that early physiotherapy intervention can delay or even prevent surgical management for certain pelvic disorders, particularly when combined with lifestyle and behavioral modifications. Special populations, such as postpartum women, older adults, and prostatectomy patients, particularly benefit from targeted interventions.

Despite its proven efficacy, physiotherapy for pelvic health continues to face barriers related to limited-service access, inconsistent clinician training, and lack of standardized treatment protocols. Overcoming these challenges requires coordinated efforts among policymakers, educators, and healthcare providers. Establishing accredited pelvic health training programs, implementing reimbursement pathways for conservative interventions, and incorporating physiotherapy into multidisciplinary pelvic care models would enhance access and quality of care.

In parallel, emerging telehealth and app-based exercise systems hold promise for broadening reach, yet digital equity, privacy, and adherence must be carefully managed. Hybrid rehabilitation models—combining in-person assessment with digital follow-up—represent a pragmatic future direction for sustainable pelvic health programs.

Future research should focus on long-term effectiveness, real-world implementation, and inclusive strategies that address the needs of underserved and diverse populations. With sustained investment in education, infrastructure, and digital innovation, physiotherapy will continue to serve as a cornerstone of holistic, non-invasive pelvic health care and contribute substantially to global quality of life and healthcare sustainability.

Footnotes

Authorship Contributions

Concept: Ö.B.Ç., B.E., Design: Ö.B.Ç., B.E., Data Collection or Processing: Ö.B.Ç., Analysis or Interpretation: Ö.B.Ç., Literature Search: Ö.B.Ç., B.E., Writing: Ö.B.Ç., B.E.

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