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Effectiveness of Exercise-based Interventions on Pelvic Floor Function in Postpartum Women: A Literature Review

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ABSTRACT

Background. Pregnancy and childbirth are major risk factors for postpartum pelvic floor dysfunction, including urinary and anal incontinence and pelvic organ prolapse. Although pelvic floor muscle training (PFMT) is widely recommended as first-line management, its benefits appear predominantly short-term and functional.

Aim. To synthesize evidence on the effectiveness and limitations of exercise-based interventions, particularly PFMT, in postpartum pelvic floor dysfunction.

Materials and Methods. A structured literature review was conducted using PubMed and Google Scholar. Primary studies published between 2015 and 2025 involving postpartum women and evaluating PFMT, general exercise, or multimodal pelvic floor rehabilitation were included. Thirty-two studies were analyzed qualitatively.

Results. PFMT consistently improved pelvic floor muscle strength and reduced urinary incontinence symptoms in the short term, particularly in symptomatic women. Targeted PFMT was more effective than general exercise. Evidence for anal incontinence was limited, and neuromuscular improvements rarely translated into meaningful continence outcomes. PFMT improved prolapse-related symptoms but did not induce anatomical improvement. Technology-assisted interventions improved adherence, while low-impact postpartum exercise appeared safe.

Conclusions. PFMT is effective for short-term functional improvement in postpartum women but is insufficient as a stand-alone intervention for long-term continence outcomes or structural pelvic organ prolapse. Further research should focus on long-term follow-up and individualized, multimodal rehabilitation.

Keywords: postpartum, pelvic floor dysfunction, urinary incontinence, anal incontinence, pelvic organ prolapse, pelvic floor muscle training, PFMT, exercise-based rehabilitation

1. Introduction

Childbirth, even when it follows a completely physiological course, can result in measurable changes in both the physical and psychological functioning of women. One of the most common postpartum consequences is pelvic floor dysfunction (PFD), encompassing urinary incontinence, pelvic organ prolapse (POP), and reduced pelvic floor muscle strength. These conditions are prevalent during the first year after childbirth and may negatively affect functional capacity, movement quality, and the ability to perform daily activities and structured physical exercise (Beamish et al., 2025; Woodley et al., 2020).

Exercise-based interventions are widely recommended as first-line conservative strategies for postpartum PFD, with pelvic floor muscle training (PFMT) representing the most extensively studied approach. Evidence indicates that PFMT improves pelvic floor muscle function and reduces urinary symptoms; however, its effectiveness in preventing or reversing postpartum structural changes, including pelvic organ prolapse, remains inconsistent (Beamish et al., 2025; Sigurdardottir et al., 2023). In parallel, emerging evidence suggests that general postpartum exercise, when appropriately prescribed, does not adversely affect pelvic floor function and may support functional recovery, although substantial heterogeneity in intervention type, dosage, and supervision persists (Tennfjord et al., 2020; Stafne et al., 2022).

Therefore, this review aims to synthesize current evidence on the effects and limitations of exercise-based interventions, including PFMT and general physical exercise, on pelvic floor function in the postpartum period, with particular emphasis on functional and clinical outcomes.

Research Objective

To analyze and synthesize current scientific evidence regarding the effects of exercise-based interventions performed during the perinatal period (antenatal and postpartum) on pelvic floor function, including pelvic floor muscle performance, the incidence, and mechanisms of pelvic floor disorders.

Research Problems

1. What are the effects of exercise-based interventions on pelvic floor muscle function in postpartum women?
2. To what extent does pelvic floor muscle training (PFMT) reduce the prevalence and severity of urinary and anal incontinence in the postpartum period?

3. Does PFMT lead to measurable structural changes in the pelvic floor, including pelvic organ prolapse, as assessed by clinical examination or imaging methods?
4. Do technology-assisted interventions (e.g., mobile applications, biofeedback, or device-supported training) improve the effectiveness or adherence of PFMT in postpartum women?
5. Are the effects of PFMT and related exercise-based interventions predominantly functional (e.g., muscle strength, neuromuscular control, symptom reduction) rather than structural (e.g., anatomical prolapse stage)?

Research Hypothesis

Exercise-based interventions, including pelvic floor muscle training, have a beneficial effect on pelvic floor function during the postpartum period.

2. Research Materials and Methods

2.1. Study Population

This review included studies involving women in the postpartum period. Studies restricted exclusively to pregnant women without postpartum follow-up or lacking outcomes related to pelvic floor function or physical performance were excluded.

2.2. Literature Search Strategy

The literature review was conducted using a structured and transparent search approach informed by selected PRISMA 2020 recommendations. A comprehensive literature search was performed using PubMed and Google Scholar to identify relevant studies published between January 2015 and December 2025.

The search strategy combined the following terms and their synonyms: postpartum, postnatal, puerperium; pelvic floor, pelvic floor dysfunction, pelvic floor disorders, urinary incontinence, pelvic organ prolapse; exercise, physical activity, pelvic floor muscle training, PFMT, pelvic floor exercises, and pelvic floor rehabilitation. Boolean operators (AND/OR) were applied to broaden and refine the search.

An additional search in Google Scholar identified nine potentially relevant studies. After full-text assessment and removal of duplicates across databases, a total of 32 primary studies were included in the qualitative synthesis.

As the objective of this study was to provide a narrative overview of current evidence, no formal risk-of-bias assessment or methodological quality scoring was performed

2.3. Eligibility Criteria

Studies were included if they met the following criteria:

- involved postpartum women (≤ 12 months after childbirth) or interventions initiated during pregnancy with outcomes assessed postpartum;
- evaluated exercise-based interventions, including pelvic floor muscle training (PFMT), general physical exercise, or multimodal pelvic floor rehabilitation; and
- were primary research studies (randomized controlled trials, clinical trials, or observational studies) reporting clinical or functional pelvic floor outcomes in the postpartum period. Only full-text articles published in English were considered.

Studies were excluded if they were systematic reviews, meta-analyses, or study protocols; involved antenatal-only populations without postpartum outcome assessment; were qualitative or purely descriptive in nature; or did not include an exercise-based intervention.

The eligibility criteria were applied in an exploratory and pragmatic manner to organize and synthesize the available evidence, rather than to conduct a formal systematic review strictly adhering to a predefined protocol.

2.4. Study Selection

The PubMed search yielded 106 records. Following title and abstract screening and subsequent full-text assessment, 25 primary studies met the inclusion criteria. An additional search in Google Scholar identified 12 further eligible studies not indexed in PubMed.

After removal of duplicates and application of the eligibility criteria, a total of 32 primary studies were included in the qualitative synthesis.

3. Research results

3.1 Impact of Exercise-Based Interventions on Pelvic Floor Muscle Function and Strength

Pelvic floor muscle (PFM) strength is widely recognized as a key component of pelvic floor function and a primary therapeutic target of pelvic floor muscle training (PFMT) interventions in postpartum women. Improvements in PFM strength are associated with enhanced neuromuscular control and may contribute to reductions in pelvic floor–related symptoms.

Consequently, PFM strength is one of the most frequently reported outcome measures in studies evaluating the effectiveness of PFMT-based exercise programmes.

Across the literature, PFM strength has been assessed using both subjective clinical scales and objective instrumental methods. The Modified Oxford Scale, based on digital vaginal palpation, remains one of the most commonly used clinical tools due to its feasibility and widespread clinical acceptance, as standardized by the International Continence Society terminology report (Frawley et al., 2021). Objective assessments include perineometry, which quantifies intravaginal pressure generated during voluntary PFM contraction, and surface electromyography (EMG), which provides detailed information on muscle activation patterns, endurance, and contraction quality.

3.1.1 Classical Pelvic Floor Muscle Training (PFMT)

Available evidence consistently demonstrates that classical pelvic floor muscle training (PFMT) improves pelvic floor muscle (PFM) strength in postpartum women. Studies employing the Modified Oxford Scale report significantly higher muscle strength scores following structured PFMT interventions compared with control conditions (Schütze et al., 2022; Ye et al., 2025). However, gains in clinically assessed muscle strength are not uniformly associated with broader functional outcomes, such as sexual function or complete symptom resolution, suggesting that strength improvements alone may not fully explain functional recovery (Schütze et al., 2022; Kahyaoglu Sut & Balkanli Kaplan, 2015).

Objective assessments further support the beneficial effects of PFMT on neuromuscular recovery. Using perineometry, Kahyaoglu Sut and Balkanli Kaplan (2015) demonstrated that pelvic floor muscle strength declines during pregnancy but recovers more effectively in the postpartum period among women who perform PFMT compared with those who do not. Although PFMT was associated with improved muscle strength and prevention of deterioration in urinary symptoms and quality of life, short-term changes in symptom questionnaire scores were modest, highlighting the complex and non-linear relationship between strength gains and symptom perception.

Consistent with these findings, Gagnon et al. (2016) reported significant improvements in pelvic floor–related quality of life and Modified Oxford Scale–assessed muscle strength following a postpartum PFMT programme delivered through a two-tiered model combining group education with optional individual sessions. High participant satisfaction was observed; however, the absence of a control group limits causal inference and conclusions regarding structural pelvic floor outcomes.

Recent evidence also suggests that PFMT embedded within comprehensive behavior change–oriented frameworks may further enhance neuromuscular outcomes. Ye et al. (2025) demonstrated greater improvements in Modified Oxford Scale grades, electromyographic parameters, and pelvic floor muscle fiber characteristics in women receiving PFMT supported by an integrated health behavior change–based intervention compared with standard care. Nevertheless, these findings were limited to short-term follow-up, and the absence of long-term outcome data restricts conclusions regarding sustained functional or structural effects.

In addition to randomized controlled trials, quasi-experimental studies indicate potential benefits of exercise-based pelvic floor strengthening. Vaddi (2024) observed improvements in pelvic floor muscle function following a postpartum strengthening exercise programme; however, the lack of a control group limits causal inference, and these findings should be interpreted cautiously. Collectively, the current body of evidence supports the effectiveness of classical PFMT in improving postpartum pelvic floor muscle strength and perceived function, while underscoring the need for rigorously designed controlled trials with extended follow-up to clarify the durability and clinical significance of these effects.

3.1.2 Electrical Stimulation / Transvaginal Electrical Stimulation (EMS/TVES)

Electrical stimulation (EMS), including transvaginal electrical stimulation (TVES), has been investigated as an adjunct or alternative to voluntary PFMT, particularly in women with markedly reduced PFM strength and difficulty performing effective voluntary contractions. Instrument-based assessments indicate that EMS may enhance neuromuscular activation even when changes in clinically assessed muscle strength are modest or absent.

Li et al. (2020) reported significant improvements in EMG parameters related to contraction amplitude, stability, and coordination following TVES, along with an increased ability to perform correct PFM contractions. However, these neuromuscular improvements were not consistently reflected in digital vaginal palpation scores, underscoring discrepancies between clinical assessment and instrument-based measurements. Comparative evidence further suggests that while both EMS and voluntary Kegel exercises improve PFM strength measured by perineometry, EMS may elicit greater short-term gains (Li et al., 2020; Roziana et al., 2025). These findings indicate that EMS may offer additional benefits for early strength enhancement in women with limited voluntary muscle control during the early postpartum period.

3.1.3 Biofeedback-Based Training

Biofeedback and technology-assisted interventions extend conventional PFMT by facilitating motor learning, improving contraction accuracy, and enhancing patient engagement. These approaches may be particularly beneficial for postpartum women who experience difficulty identifying or correctly activating the pelvic floor muscles.

Zhao et al. (2024) demonstrated that a five-week structured PFMT programme incorporating supervised exercises, biofeedback, and electrical stimulation resulted in significant improvements in PFM strength assessed using the Modified Oxford Scale, EMG, and visual analog scales. Despite these functional gains, no significant changes were observed in the pelvic organ prolapse stage measured using the POP-Q system, reinforcing the distinction between functional improvement and structural outcomes. Similarly, pressure-mediated biofeedback combined with PFMT was shown to be more effective than PFMT alone in improving treatment outcomes in women with stress urinary incontinence (Wang et al., 2024). Taken together, these findings suggest that biofeedback-based technologies may optimize neuromuscular control and strength development, although their impact on anatomical restoration remains limited.

3.1.4 Integrated Findings

- **PFMT leads to measurable improvements in pelvic floor muscle strength** in postpartum women, as assessed by both clinical palpation scales and objective instrumental measures (Kahyaoglu Sut & Balkanli Kaplan, 2015; Schütze et al., 2022; Ye et al., 2025);
- **Objective measurement tools (perineometry and EMG) are more sensitive than digital palpation** in detecting training-induced neuromuscular changes, particularly in early postpartum interventions (Li et al., 2020; Roziana et al., 2025);
- **Strength gains do not consistently translate into improvements in functional or symptomatic outcomes**, such as sexual function or pelvic organ support, highlighting the multifactorial nature of pelvic floor recovery (Schütze et al., 2022; Zhao et al., 2024);
- **Adjunctive modalities, including electrical stimulation and biofeedback, may enhance short-term neuromuscular activation and strength**, especially in women with severely reduced voluntary muscle control, but evidence for

sustained or structural effects remains limited (Li et al., 2020; Wang et al., 2024; Ye et al., 2025);

- **Findings from quasi-experimental studies support the potential effectiveness of postpartum strengthening programmes**, although the absence of control groups limits causal inference and warrants cautious interpretation (Vaddi, 2024).

3.2 Mobile Applications and Device-Assisted Interventions Supporting Pelvic Floor Muscle Training

Mobile applications and device-assisted technologies have been introduced as adjuncts to pelvic floor muscle training (PFMT) in postpartum women, primarily to support adherence, correct muscle activation, and training engagement. Across studies, these interventions demonstrate potential short-term benefits for pelvic floor muscle performance, although their clinical effectiveness remains variable.

Device-assisted intravaginal trainers have been associated with improvements in pelvic floor muscle strength and reductions in pelvic floor dysfunction symptoms during the early postpartum period (Artymuk & Khapacheva, 2020). In the study by Artymuk and Khapacheva (2020), short-term reductions in pelvic floor dysfunction symptoms were reported; however, the absence of long-term follow-up limits conclusions regarding sustained clinical effectiveness. Similarly, smartphone-based reminder systems have been shown to significantly improve adherence to PFMT and enhance electromyographic indicators of pelvic floor muscle endurance and activation (Chu et al., 2023). However, in both device-based and app-based interventions, improvements in muscle performance were not consistently accompanied by reductions in urinary incontinence symptoms, suggesting a dissociation between neuromuscular gains and short-term clinical outcomes.

Feasibility-focused studies further indicate that the effectiveness of mobile health solutions is strongly influenced by usability and user experience. While postpartum women perceive mHealth-supported PFMT as conceptually valuable, technical difficulties, discomfort, and the perceived superiority of initial professional instruction limit acceptance and sustained use (Dufour et al., 2019).

Overall, current evidence suggests that mobile and device-assisted PFMT interventions may enhance adherence and neuromuscular outcomes in the short term, but their added value over

well-instructed conventional PFMT remains inconsistent. Integration with professional supervision and improvements in usability appear critical for maximizing their clinical relevance.

3.2.1 Integrated Findings

- Mobile applications and device-assisted PFMT interventions are associated with **short-term improvements in pelvic floor muscle performance and selected pelvic floor–related symptoms,** particularly in the early postpartum period. However, **evidence for sustained clinical effectiveness remains limited**, largely due to the absence of long-term follow-up (Artymuk & Khapacheva, 2020; Chu et al., 2023).
- **The clinical effectiveness of mHealth-supported PFMT appears to be strongly dependent on usability and integration with professional supervision.** Technical difficulties, device-related discomfort, and the perceived superiority of initial in-person instruction limit long-term acceptance and sustained use of these interventions (Dufour et al., 2019).

3.3 General Physical Activity and Postpartum Pelvic Floor Function

General exercise, including aerobic and low- to moderate-impact physical activity, plays an important role in postpartum recovery and may influence pelvic floor health indirectly through improvements in global strength, coordination, and trunk stability. Unlike isolated pelvic floor muscle training (PFMT), these interventions are not specifically designed to target the pelvic floor muscles and may affect them only via synergistic activation and load transfer mechanisms.

Evidence from prospective cohort studies indicates that early postpartum engagement in general physical activity does not negatively affect pelvic floor muscle function or increase the risk of pelvic floor disorders. Vesting et al. (2024) demonstrated that women who engaged in low-impact exercise during the first postpartum year reported lower pelvic girdle pain severity and showed greater increases in clinically assessed pelvic floor muscle strength compared with nonexercisers. Importantly, stress urinary incontinence increased over time only among nonexercisers, whereas it remained stable or decreased in women performing low-impact exercise, suggesting a potential protective role of early, appropriately dosed physical activity.

Similarly, Tennfjord et al. (2020) reported that regular general exercise initiated as early as six weeks postpartum was not associated with adverse changes in pelvic floor muscle strength, endurance, or resting pressure, nor with increased prevalence of stress urinary incontinence or

pelvic organ prolapse at 12 months postpartum. Instead, pelvic floor dysfunction outcomes were more strongly associated with non-exercise-related factors, including higher body mass index and physically strenuous occupations. Collectively, these findings support the safety of early postpartum general exercise when appropriately prescribed.

However, evidence suggests that general physical fitness and overall muscular strength do not directly translate into greater pelvic floor muscle force. In a cross-sectional analysis of primiparous women one year postpartum, Moss et al. (2020) found no significant associations between maximal pelvic floor muscle force and measures of general strength, trunk muscle endurance, body composition, or self-reported physical activity. These findings persisted after adjustment for pelvic floor muscle exercise practice and support the concept that pelvic floor muscle strength is largely task-specific and unlikely to improve through general fitness training alone.

When comparing different exercise modalities, training specificity appears to influence neuromuscular outcomes. In a randomized controlled trial, Ehsani et al. (2020) demonstrated that stabilization exercises resulted in greater improvements in pelvic floor muscle and transverse abdominis activation than general exercise in women with postpartum lumbopelvic pain. Nevertheless, despite superior neuromuscular activation, no significant between-group differences were observed in pain reduction, indicating that biomechanical improvements do not necessarily correspond to superior clinical outcomes.

The potential additive role of aerobic exercise has also been explored. El Nahas et al. (2017) reported that combining aerobic exercise with biofeedback-assisted PFMT resulted in greater improvements in pelvic floor muscle strength and thickness compared with PFMT alone. However, as aerobic exercise was not applied independently, these findings do not allow attribution of pelvic floor benefits to aerobic training per se.

Overall, current evidence indicates that general and aerobic exercise—particularly when low impact and progressively introduced—is safe in the postpartum period and may support pelvic floor health indirectly. Nevertheless, improvements in pelvic floor muscle strength or activation associated with general or stabilization exercise should not be considered equivalent to the effects of targeted PFMT. Pelvic floor muscle strength appears to require specific, consistent, and task-oriented training, underscoring the importance of individualized postpartum exercise prescription that integrates, rather than replaces, pelvic floor–specific interventions.

3.3.1 Integrated Findings

- **Low- to moderate-impact general exercise initiated early postpartum is safe for the pelvic floor** and is not associated with an increased risk of urinary incontinence or pelvic organ prolapse (Tennfjord et al., 2020; Vesting et al., 2024).
- **Regular physical activity may indirectly support pelvic floor recovery**, as nonexercisers demonstrate higher pelvic girdle pain severity and greater increases in stress urinary incontinence over time (Vesting et al., 2024);
- **General muscular strength, trunk endurance, and overall fitness are not associated with greater pelvic floor muscle force**, reinforcing the task-specific nature of pelvic floor muscle function (Moss et al., 2020);
- **General and aerobic exercise should be considered complementary rather than substitutive to PFMT**, as neuromuscular or fitness-related gains do not consistently translate into improved pelvic floor outcomes without targeted pelvic floor organ prolapse (Tennfjord et al., 2020; Vesting et al., 2024);or training (Ehsani et al., 2020; El Nahas et al., 2017).

3.4 Urinary Incontinence in the Postpartum Period and Exercise-Based Interventions

Urinary incontinence (UI) is a prevalent condition in the postpartum period, with pregnancy and childbirth recognized as key risk factors. Exercise-based interventions, particularly pelvic floor muscle training (PFMT), are commonly recommended as first-line conservative management. Although a substantial body of research supports the short-term effectiveness of PFMT, the magnitude, persistence, and clinical relevance of these effects vary depending on study design, population characteristics, and duration of follow-up.

3.4.1 Effects of Early Postpartum and Antenatal PFMT

Randomized controlled trials consistently indicate that PFMT initiated during pregnancy or in the early postpartum period is associated with reduced prevalence and severity of UI in the short term, particularly among women who report symptoms during pregnancy. Johannessen et al. (2021) demonstrated a significantly lower prevalence of UI three months postpartum among women participating in a structured antenatal exercise programme that included PFMT, with the most pronounced benefit observed in women incontinent at baseline.

Similarly, Sigurdardottir et al. (2020) reported that individualized, physiotherapist-guided PFMT initiated early postpartum resulted in reductions in UI prevalence and symptom-related

bother at six months postpartum, accompanied by improvements in pelvic floor muscle strength and endurance. These findings are supported by quasi-experimental evidence indicating that antenatal exercise programmes incorporating pelvic floor muscle education may reduce the perceived impact of UI during the first postpartum year (Szumilewicz et al., 2020).

Taken together, these studies indicate that early, structured, and supervised pelvic floor muscle training (PFMT) is associated with clinically meaningful short-term reductions in urinary incontinence symptoms, particularly among women with elevated baseline risk. However, evidence from longer follow-up suggests that these symptomatic benefits may not persist, as Sigurdardottir et al. reported no between-group differences in urinary or anal incontinence outcomes at 12 months postpartum despite sustained improvements in pelvic floor and anal muscle strength and endurance in the intervention group.

3.4.2 PFMT Compared With Other Exercise Approaches

When PFMT is compared with other forms of exercise, evidence supports the principle of training specificity. In a randomized trial, Kavasoglu Kaya and Yilmaz Menek (2024) found that both PFMT and core stabilization exercises improved UI-related outcomes compared with no intervention; however, PFMT resulted in greater reductions in symptom severity and greater improvements in quality-of-life measures. These findings indicate that while general or core-focused exercise may provide some benefit, targeted pelvic floor training appears more effective for UI symptom management.

3.4.3 Technology-Supported Delivery of PFMT

Recent studies have explored whether technology-assisted delivery methods can enhance the effectiveness of PFMT. Wang and An (2023) reported that PFMT supported by internet-based supervision, as well as PFMT combined with online-guided Pilates, resulted in greater short-term reductions in urine leakage volume, pad use, and incontinence episodes compared with PFMT delivered without digital support. Improvements in pelvic floor muscle strength were observed across all intervention groups, suggesting that the added benefit of technology may be mediated primarily through improved adherence, engagement, and exercise quality rather than through fundamentally different physiological effects.

3.4.4 Long-Term Outcomes and Clinical Implications

Despite consistent short-term benefits, evidence for sustained long-term effects of PFMT on UI prevalence remains limited. In a seven-year follow-up of a randomized controlled trial, Stafne

et al. (2022) found no significant differences in UI prevalence between women who had participated in antenatal exercise programmes including PFMT and those who received standard care. Instead, UI during pregnancy emerged as the strongest predictor of long-term UI, while regular exercise was not independently associated with continence status.

These findings are consistent with earlier observations suggesting that exercise-related improvements in UI are largely time-limited and do not appear to modify long-term continence trajectories. Long-term outcomes appear to be more strongly influenced by obstetric and individual factors, such as baseline urinary incontinence and birth-related injury, rather than by exercise participation alone (Stafne et al., 2022). Moreover, heterogeneity in intervention protocols, outcome measures, and reliance on self-reported UI outcomes complicates direct comparison across studies and limits conclusions regarding sustained preventive effects.

Overall, PFMT should be regarded as an effective conservative intervention for short-term symptom management in postpartum UI, particularly among women who are symptomatic during pregnancy or early postpartum. However, current evidence does not support PFMT as a stand-alone strategy for long-term UI prevention, underscoring the need for individualized, multimodal postpartum care and further long-term research.

3.4.5 Integrated Findings

- **Pelvic floor muscle training (PFMT) provides clinically meaningful short-term reduction in postpartum urinary incontinence**, particularly when initiated during pregnancy or early postpartum and among women symptomatic at baseline (Johannessen et al., 2021; Sigurdardottir et al., 2020; Szumilewicz et al., 2020).
- **The effectiveness of PFMT is time-limited and outcome-specific**, with consistent benefits for symptom reduction and pelvic floor muscle function, but **no convincing evidence for sustained long-term prevention of urinary incontinence** (Stafne et al., 2022; Johannessen et al., 2021).
- **Targeted PFMT is more effective than general or core-focused exercise for urinary incontinence symptom management**, supporting the principle of training specificity in postpartum pelvic floor rehabilitation (Kavasoglu Kaya & Yilmaz Menek, 2024).
- **Long-term continence outcomes appear to be driven primarily by obstetric and individual risk factors** (e.g., urinary incontinence during pregnancy and birth-related injury) **rather than exercise participation alone** (Stafne et al., 2022).

3.5 Anal Incontinence in the Postpartum Period and Exercise-Based Interventions

Anal incontinence (AI) is a clinically important but less extensively studied form of postpartum pelvic floor dysfunction, most strongly associated with obstetric trauma and anal sphincter injury. Compared with urinary incontinence, evidence supporting the effectiveness of exercise-based interventions, particularly pelvic floor muscle training (PFMT), remains limited.

Randomized controlled trials suggest that PFMT may result in small improvements in anal incontinence symptom scores; however, these effects are inconsistent and of limited clinical magnitude. Johannessen et al. reported a modest but statistically significant reduction in St. Mark's scores following PFMT, which was not accompanied by consistent improvements in secondary outcomes and appeared dependent on training adherence and baseline structural integrity. Similarly, Sigurdardottir et al. (2020) observed improvements in pelvic floor and anal muscle strength without corresponding reductions in anal incontinence prevalence or symptom-related bother at 12 months postpartum.

Overall, available evidence indicates that neuromuscular gains achieved through PFMT do not reliably translate into clinically meaningful improvements in postpartum anal continence. Structural and neurogenic injury appear to play a dominant role in AI pathophysiology, limiting the effectiveness of exercise-based interventions when used in isolation.

3.5.1 Integrated Findings

- **PFMT may lead to modest improvements in anal incontinence symptom severity**, but effects are inconsistent, small in magnitude, and often dependent on adherence and baseline anatomy (Johannessen et al., 2016).
- **Improvements in anal sphincter muscle strength do not consistently translate into reduced anal incontinence or symptom-related bother**, indicating a dissociation between neuromuscular adaptation and functional continence (Sigurdardottir et al., 2020).
- **Current evidence does not support PFMT as an effective stand-alone intervention for postpartum anal incontinence**, as structural and obstetric factors appear to exert a greater influence on long-term outcomes.

3.6 Pelvic Organ Prolapse in the Postpartum Period and Exercise-Based Interventions

Pelvic organ prolapse (POP) is a structural manifestation of pelvic floor dysfunction that commonly presents in a mild or subclinical form during the postpartum period. Spontaneous

improvement related to tissue recovery, neuromuscular adaptation, and hormonal changes is frequently observed within the first year after childbirth. Consequently, the extent to which exercise-based interventions—particularly pelvic floor muscle training (PFMT)—can prevent prolapse progression or induce structural recovery remains uncertain.

3.6.1 PFMT and Structural Outcomes of Postpartum Pelvic Organ Prolapse

Original studies consistently demonstrate that PFMT improves pelvic floor muscle strength and may reduce prolapse-related symptom burden, as reflected in quality-of-life measures and patient-reported outcomes. However, randomized controlled trials and secondary analyses indicate that these functional improvements do not translate into meaningful anatomical changes.

Sigurdardottir et al. (2023), in a secondary analysis of a randomized controlled trial, showed that PFMT initiated postpartum did not reduce POP-Q stage or prevent prolapse at 12 months postpartum, despite improvements in pelvic floor muscle function. Similarly, Hilde et al. (2023) found no effect of PFMT on levator ani avulsion status or levator hiatus area. Collectively, these findings suggest that strengthening pelvic floor muscles alone is insufficient to reverse childbirth-related structural injury.

3.6.2 Multimodal Rehabilitation Approaches

More favorable short-term outcomes have been reported in studies employing multimodal rehabilitation strategies combining PFMT with biofeedback and/or electrical stimulation. Zhao et al. (2024) demonstrated that a five-week structured PFMT programme incorporating supervised exercises, biofeedback, and electrical stimulation led to significant improvements in pelvic floor muscle strength, electromyographic activity, and ultrasound-derived parameters, including bladder neck position and hiatus area. Importantly, despite these functional and positional improvements, no significant change in overall POP-Q stage was observed, reinforcing the distinction between functional adaptation and true anatomical correction.

Similarly, Yin and Wang (2022) reported ultrasound-based improvements in levator ani muscle thickness and reductions in perineal hiatus dimensions in women with mild to moderate postpartum POP undergoing pelvic floor rehabilitation training. However, these changes were modest, short-term, and did not consistently translate into clinically meaningful prolapse downstaging.

In a large retrospective cohort, Wu et al. (2024) found that electrical stimulation combined with biofeedback resulted in symptomatic and functional improvement in postpartum women with POP. Treatment efficacy was strongly influenced by baseline POP-Q stage and parity, with greater benefits observed in women with milder prolapse. Nevertheless, consistent anatomical regression of POP according to standardized criteria was not demonstrated.

3.6.3 General Exercise and Risk of POP Progression

Evidence from cohort studies indicates that general postpartum exercise does not increase the risk of POP progression. Tennfjord et al. (2020) reported no association between early postpartum general exercise and adverse changes in pelvic floor muscle function or prolapse prevalence at 12 months postpartum. Instead, non-modifiable or contextual factors such as baseline prolapse severity, parity, body mass index, and physically strenuous occupations were more strongly associated with POP outcomes.

These findings suggest that avoidance of physical activity is not supported as a preventive strategy for postpartum POP and that appropriately prescribed exercise is unlikely to exacerbate prolapse during recovery.

3.6.4 Integrated Findings

- **Pelvic floor muscle training (PFMT) improves pelvic floor muscle function and may reduce prolapse-related symptoms**, but **does not result in meaningful anatomical improvement of postpartum pelvic organ prolapse**, including POP-Q stage or levator ani integrity (Sigurdardottir et al., 2023; Hilde et al., 2023).
- **Multimodal rehabilitation approaches** (PFMT combined with biofeedback and/or electrical stimulation**) may produce short-term functional or ultrasound-based improvements**; however, **these changes do not represent true structural correction of POP** (Zhao et al., 2024; Yin & Wang, 2022; Wu et al., 2024).
- **General postpartum exercise does not increase the risk of POP progression**, with prolapse outcomes being more strongly associated with baseline severity and obstetric or individual risk factors than with exercise participation (Tennfjord et al., 2020).

4. Discussion

This review synthesizes current evidence on the effects of exercise-based interventions, with particular emphasis on pelvic floor muscle training (PFMT), on pelvic floor function in postpartum women. The findings indicate that PFMT primarily exerts short-term neuromuscular and symptom-modifying effects, most consistently reflected in improvements in pelvic floor muscle strength and reductions in urinary incontinence. In contrast, available evidence suggests that the impact of PFMT on anal incontinence and structural pelvic floor disorders, including pelvic organ prolapse, remains limited, inconsistent, and strongly influenced by baseline anatomical and obstetric factors. Collectively, these results highlight the complexity of postpartum pelvic floor recovery and underscore the importance of distinguishing between functional improvement and true structural restoration when interpreting the effectiveness of exercise-based interventions.

Across randomized controlled trials and observational studies, PFMT consistently resulted in measurable improvements in pelvic floor muscle strength, as assessed using both clinical palpation scales and objective instrumental methods. However, increases in muscle strength were not uniformly accompanied by improvements in functional outcomes such as continence, sexual function, or anatomical support. This dissociation suggests that neuromuscular recovery alone is insufficient to restore complex pelvic floor functions and that postpartum pelvic floor dysfunction reflects the interaction of muscular, connective tissue, neural, and behavioral factors.

With respect to urinary incontinence, the evidence supports PFMT as an effective conservative intervention in the short term, particularly when initiated during pregnancy or early postpartum and delivered in a structured and supervised manner. The greatest benefits were observed among women who were symptomatic during pregnancy, indicating that baseline continence status plays a critical role in treatment responsiveness. In contrast, long-term follow-up studies consistently demonstrate that early PFMT does not prevent urinary incontinence several years after childbirth. Instead, obstetric factors, including urinary incontinence during pregnancy and childbirth-related injury, appear to exert a stronger influence on long-term continence outcomes than exercise participation alone.

In the context of anal incontinence, the available evidence does not support PFMT as an effective stand-alone intervention. Although improvements in anal sphincter muscle strength and endurance have been reported, these neuromuscular adaptations rarely translate into

clinically meaningful reductions in anal incontinence prevalence or symptom-related bother. Structural sphincter injury and neurogenic damage appear to be the dominant determinants of postpartum anal continence, thereby limiting the effectiveness of exercise-based approaches when used in isolation.

Similarly, PFMT has been shown to improve prolapse-related symptoms and quality-of-life measures but does not reliably result in anatomical improvement of pelvic organ prolapse. Randomized trials and secondary analyses consistently indicate no effect of PFMT on POP-Q stage, levator ani avulsion status, or levator hiatus dimensions. Multimodal rehabilitation strategies combining PFMT with biofeedback or electrical stimulation may yield short-term functional or ultrasound-based improvements, particularly in women with mild prolapse; however, these changes do not constitute true structural correction. Importantly, evidence indicates that general postpartum exercise does not increase the risk of prolapse progression, supporting the safety of appropriately prescribed physical activity during postpartum recovery.

Emerging digital and device-assisted PFMT interventions show potential for improving adherence and short-term neuromuscular outcomes. Nevertheless, their added clinical value over well-instructed conventional PFMT remains inconsistent, and their effectiveness appears highly dependent on usability, patient engagement, and integration with professional supervision.

Overall, the findings of this review emphasize that postpartum pelvic floor recovery is governed by a complex interplay of neuromuscular, structural, obstetric, and behavioral factors. Exercise-based interventions, particularly PFMT, appear most effective when applied in a targeted and individualized manner and integrated into broader postpartum care strategies, rather than being viewed as universal or stand-alone solutions for pelvic floor dysfunction.

5. Conclusion

Exercise-based interventions, particularly pelvic floor muscle training (PFMT), play a clinically relevant yet inherently limited role in postpartum pelvic floor rehabilitation. The available evidence consistently demonstrates that PFMT improves pelvic floor muscle strength and reduces urinary incontinence symptoms in the early postpartum period, especially among women presenting with pre-existing symptoms. However, current data do not support PFMT as a stand-alone strategy for long-term prevention of urinary incontinence, effective management of anal incontinence, or reversal of anatomical pelvic organ prolapse.

General physical activity and low-impact exercise appear to be safe during the postpartum period and may indirectly support pelvic floor health through broader functional and musculoskeletal benefits; nevertheless, they do not substitute for targeted pelvic floor–specific training. Adjunctive modalities, including biofeedback, electrical stimulation, and mobile health–supported interventions, may enhance short-term neuromuscular outcomes and training adherence. Despite this, their clinical superiority over well-instructed conventional PFMT remains inconsistent and insufficiently established.

Overall, PFMT should be regarded as a conservative, symptom-oriented intervention that contributes to functional recovery rather than as a definitive treatment for structural pelvic floor disorders. Future research should focus on long-term follow-up, the use of standardized and clinically meaningful outcome measures, and stratification based on baseline anatomical, obstetric, and functional risk factors. Such an approach is essential to identify subgroups of women most likely to benefit from specific exercise-based interventions and to optimize individualized postpartum pelvic floor care.

Disclosure

Author Contributions:

Conceptualization: AZW
Methodology: AZW, MŁ, JJ, MN
Formal analysis: AZW, OZ, KW
Investigation: AZW, MŁ, OZ, JJ, KC, KW, SŁ, MN
Data curation: KC, SŁ, MN
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The authors declare no conflict of interest.

AI

In preparing this manuscript, the authors used generative AI tools (ChatGPT, OpenAI) solely for language editing, stylistic refinement, and improvement of clarity and readability of the text. The authors critically reviewed and edited all content generated with the assistance of AI and take full responsibility for the accuracy, originality, and scientific integrity of the final manuscript.

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