

REVIEW ARTICLE

The efficacy and optimal timing of pelvic floor muscle training for post-prostatectomy incontinence in BPH patients: A systematic review

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Abstract

Surgical intervention for benign prostatic hyperplasia (BPH) can lead to postoperative stress urinary incontinence. Pelvic floor muscle exercises (PFME) are proposed as a non-invasive strategy to mitigate symptoms, but their efficacy and optimal timing remain unclear. A systematic review of six studies (five randomized controlled trials and one prospective cohort) was conducted, evaluating PFME in men undergoing BPH surgery. Three studies investigated preoperative PFME, and three evaluated postoperative interventions. Outcomes included incontinence rates, lower urinary tract symptoms (LUTS), pelvic floor muscle strength, and quality of life. Evidence for preoperative PFME was mixed; one trial ($n = 70$) demonstrated significantly reduced incontinence at 3 months (3% vs. 26%; $p = 0.01$), while another ($n = 49$) found improved muscle endurance without clinical benefits. In contrast, postoperative PFME showed more consistent improvements. One randomized controlled trial (RCT) ($n = 61$) reported significantly better LUTS at 12 weeks (IPSS: 3.32 vs. 6.33; $p < 0.001$) and better quality of life. Another ($n = 58$) noted fewer incontinent episodes at 1–3 weeks ($p < 0.01$). However, a large multicenter randomized controlled trial ($n = 442$ TURP patients) found no long-term benefit in incontinence rates at 12 months (65% vs. 62%). In conclusion, PFME may enhance the postoperative recovery of continence and LUTS, particularly when initiated early and performed consistently. Preoperative PFME shows promise but requires further validation. Heterogeneity in study designs highlights the need for standardized, large-scale trials to define optimal PFME protocols for this population.

KEYWORDS

benign prostatic hyperplasia (BPH), incontinence, pelvic floor muscle exercises (PFME), prostatectomy, rehabilitation, urinary

Abbreviations: AEEP, anatomical endoscopic enucleation of the prostate; BPH, benign prostatic hyperplasia; ES, electrical stimulation; HoLEP, holmium laser enucleation of the prostate; ICIQ-UIISF, International Consultation on Incontinence Questionnaire Urinary Incontinence Short Form; IPSS, International Prostate Symptom Score; LUTS, lower urinary tract symptoms; OABSS, Overactive Bladder Symptom Scores; PFME, pelvic floor muscle exercises; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; RCT, randomized controlled trial; SF-36, Medical Outcome Study Short Form-36 Health Survey; TURP, transurethral resection of the prostate; UI, urinary incontinence.

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1 | INTRODUCTION

Benign prostate hyperplasia (BPH) is a common condition in elderly men that can lead to bothersome lower urinary tract symptoms (LUTS), such as dysuria, nocturia, and urinary incontinence (UI). In those who do not respond to traditional medical therapy, surgical procedures such as transurethral resection of the prostate (TURP) and holmium laser enucleation of the prostate (HoLEP) are commonly performed to relieve bladder outlet obstruction. Following surgical intervention, a widely reported side effect is stress incontinence, characterized as an involuntary leakage of urine following an increase in intrabdominal pressure^[1].

A potential intervention to manage post-surgical urinary incontinence is pelvic floor muscle exercise (PFME). It is theorized that strengthening pelvic floor muscles through repeated voluntary contractions can enhance their ability to compress the external urinary sphincter and limit detrusor activity when intrabdominal pressure increases^[2]. Despite the physiological rationale, the clinical efficacy of PFME in men receiving prostatectomies for BPH is still unclear.

In addition to the effectiveness of PFME, another key point of contention is the optimal timing of intervention. Some studies propose pre-operative PFME to proactively reduce damage to the sphincter mechanism and to shorten the duration of incontinence, while others have focused on its use as a post-operative intervention for men experiencing stress incontinence^[3]. The existing literature is characterized by significant heterogeneity due to variations in surgical techniques to treat BPH, differences in the duration of PFME assigned to each group, and the methods used to measure continence (e.g., pad test vs. survey results).

Given the uncertainty regarding PFME in men, this systematic review aims to analyze the findings from six studies: three with pre-operative PFME intervention and three with post-operative PFME intervention. We intend to provide clarity on PFME's efficacy and determine if there is an optimal time for PFME intervention in these patients.

2 | METHODS

This review was done according to the recommended items for the Preferred Reporting Items for Systematic Reviews (PRISMA) statement guidelines^[4].

2.1 | Search strategy

A comprehensive literature search was conducted on: PubMed, Scopus, Web of Science, and Cochrane Library till May 2025 to retrieve the eligible studies to be included in our systematic review. The following keywords were used: ("BPH" OR "Benign Prostatic Hyperplasia" OR

"BPO" OR "BPE" OR "Benign Prostatic Hypertrophy") AND ("PFMT" OR "Pelvic floor muscle training" OR "pelvic exercise" OR "Kegel's exercise" OR "Kegel" OR "Physical Therapy") OR ("Incontinence").

2.2 | Eligibility criteria

Our inclusion criteria included any primary research articles, either observational studies or clinical trials, about pelvic floor muscle training in patients undergoing transurethral surgery for BPH. Our main outcomes were incontinence rates, lower urinary tract symptoms (LUTS), pelvic floor muscle strength, and quality of life measures. On the other hand, we excluded *in vitro* studies, case reports, papers with unavailable full texts, studies with overlapping data sets, non-English studies, and non-original articles (i.e., reviews, commentaries, guidelines, editorials, correspondence, letters to editors, protocols, etc.).

2.3 | Screening, data extraction, and risk of bias assessment

All the retrieved results were screened blindly using Rayyan software^[5] to avoid any selection bias. The screening process was conducted in two phases: title and abstract screening and the full text screening phase. Each phase was done by two independent researchers, findings were compared, and conflicts were solved by group discussion. Data extraction was done by three independent researchers using Microsoft Excel. Newcastle Ottawa scale was used for risk of bias assessment of included studies^[6].

3 | RESULTS

Seventy-eight studies resulted from our literature search using the relevant keywords on different databases. After comprehensive screening of the retrieved results, we screened 64 studies after removing duplicates. Eventually, six studies were included in our systematic review (Figure 1). Results of risk of bias assessment are shown in Table 1 and Figure 2.

The analysis includes five randomized controlled trials (RCTs)^[7-11] and one prospective cohort study^[12]. Due to the significant heterogeneity in study design and outcomes measurement, we could not perform a meta-analysis, and the results are presented below as a narrative summary, organized together by timing of intervention.

3.1 | Pre-operative PFME ("prehabilitation" strategy)

Two RCTs investigated the efficacy of PFME before surgical intervention^[10,11]. The baseline characteristics

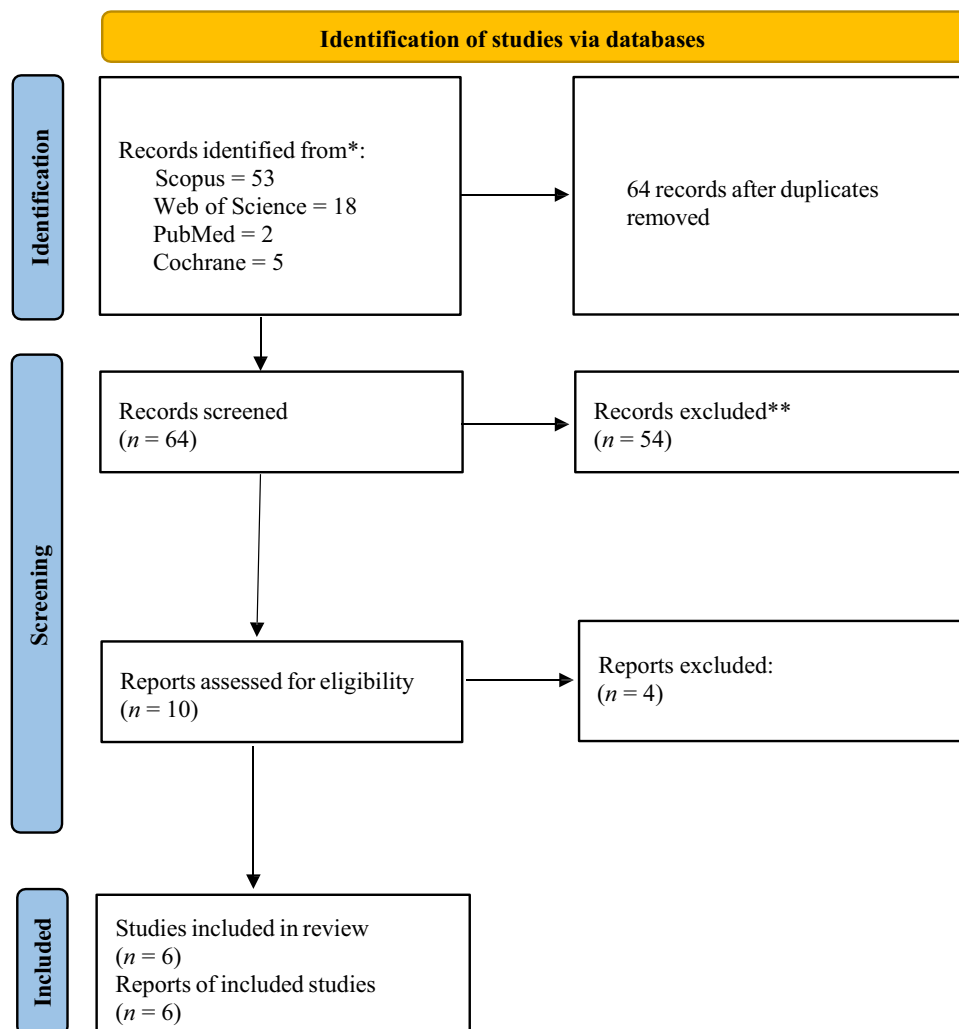


FIGURE 1 PRISMA 2020 flow diagram for new systematic reviews, which included searches of databases and registers only.

TABLE 1 Quality assessment of non-randomized controlled trials.

Study	Selection	Comparability	Outcome	Quality score
Chen et al., 2023 ^[12]	★★★	★	★★★	7

Note: Good quality: 3 or 4 stars (★) in selection domain AND 1 or 2 stars in comparability domain AND 2 or 3 stars in outcome domain; Fair quality: 2 stars in selection domain AND 1 or 2 stars in comparability domain AND 2 or 3 stars in outcome/exposure domain; Poor quality: 0 or 1 star in selection domain OR 0 star in comparability domain OR 0 or 1 star in outcome/exposure domain.

of the populations investigated were largely similar across both studies, enrolling men in their late 60s to early 70s with moderate to severe LUTS, as indicated by symptom scoring, who were candidates for surgery. Summary of studies evaluating pre-operative PFME is shown in Table 2.

The evidence for initiating pre-operative PFME to prevent or accelerate recovery from incontinence is mixed. In 2020, Anan et al. conducted a single-institution RCT that followed 70 men undergoing HoLEP, who were randomly assigned to a pre-operative PFME group and a post-operative PFME group. The

intervention group ($n = 35$) started a nurse-guided PFME program 28 prior to their operation and continued post-operatively, while the control group ($n = 35$) only began PFME post-operatively. There were no significant differences in the incontinence rate, defined as any pad usage, at the time periods of 3 days, 1 month, or 6 months. However, at 3 months, the pre-operative PFME group had an incontinence rate of 3% compared to a 26% incontinence rate in the post-operative PFME group, which was found to be a statistically significant difference ($p = 0.01$). In addition, the authors note a 0.56-fold lower risk of incontinence in patients

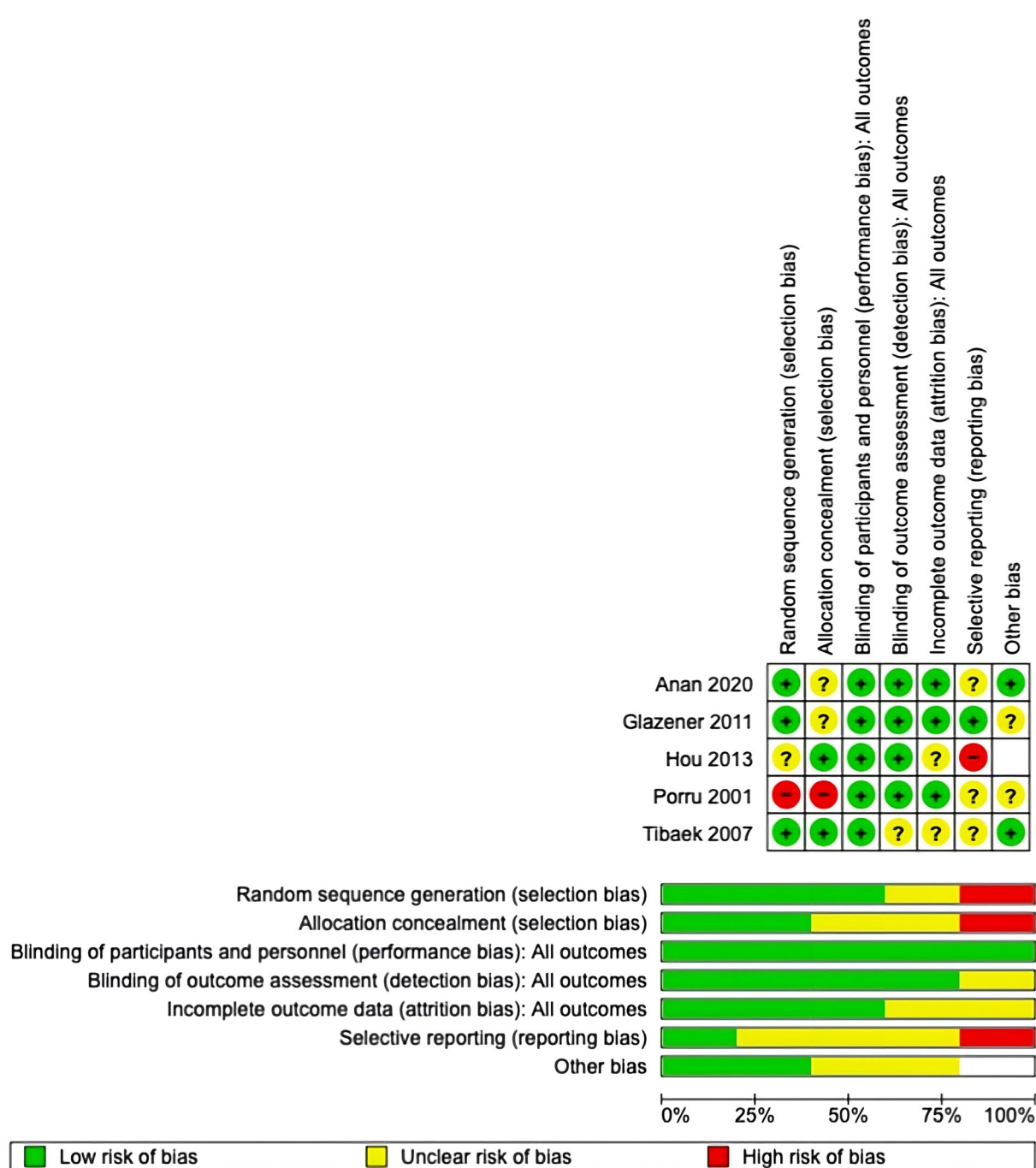


FIGURE 2 Risk of bias assessment of randomized controlled trials.

performing pre-operative PFME 1 month after receiving HoLEP surgery^[11].

On the other hand, Tiabek et al. showed a clinically insignificant improvement in LUTS in a randomized, controlled, single-blind study of 49 men who pre-operatively performed PFME and received TURP. The control group ($n=23$) received no pre-operative physiotherapy, while the intervention group ($n=26$) performed PFMT for four weeks before their scheduled surgery. As expected, the authors noted an 86%

improvement in the static endurance of the pelvic floor muscles within the treatment group ($p=0.004$). Moreover, when both groups were compared, there was a significant improvement in dynamic endurance ($p=0.049$) in the treatment group. While the training group showed significant improvement in pelvic floor muscle endurance, these functional gains did not translate into clinical benefits. When tested on the Danish Prostatic Symptom Score (DAN-PSS-1) questionnaire, there was no significant improvement in

TABLE 2 Summary of studies evaluating pre-operative PFME.

Study name, year	Design	Surgical intervention	Intervention details	Control group details	Outcomes measured	Key results
Anan et al., 2020 ^[11]	RCT	HoLEP	Performed a set of PFME exercises for 3 min at least three times a day for 28 days and continued post-operatively ($n = 35$)	Patients who started PFME post-operatively only ($n = 35$)	Primary outcome: Incontinence rate (i.e., pad usage) Secondary outcome: Quality of life (ie, International Consultation on Incontinence Questionnaire-Short Form Score)	Significantly improved incontinence rate at 3 months, but not at other time points 0.56-fold lower risk of incontinence in the intervention group at 1 month
Tibaek et al., 2007 ^[10]	RCT	TURP	Intervention group ($n = 26$) received pre-operative PFME for 4 weeks. PFME included: (1) an at-home series of progressively challenging sets of exercises to develop PFM endurance and strength for 4 weeks. (2) PFM contraction exercises for 1 h with a physiotherapist	Did not perform pre-operative PFME ($n = 23$). Along with the intervention group, they were given information regarding PFME after their surgery	Primary outcome: Total score on the DAN-PSS-1 questionnaire Secondary outcome: PFM quantification tests, symptom scores, voiding frequency and volume, pad use, and pad leakage across 24 h	Significant improvement in pelvic floor muscle strength and endurance. No significant improvement in LUTS between both groups.

Abbreviations: DAN-PSS-1, Danish Prostatic Symptom Score; HoLEP, holmium laser enucleation of the prostate; LUTS, lower urinary tract symptoms; PFME, pelvic floor muscle exercises; RCT, randomized controlled trial; TURP, transurethral resection of the prostate.

LUTS between the two groups. Additionally, there was no significant difference in objective measures of urinary function, such as urine output, voiding volume, and voiding frequency, between both groups^[10].

3.2 | Post-operative PFME (treatment strategy)

Three RCTs^[7–9] and one prospective cohort study^[12] evaluated PFME programs that were initiated after surgery. Table 3 shows a summary of studies evaluating post-operative PFME.

Gleazener et al. performed two parallel RCTs measuring incontinence rates in men performing post-operative PFME who received radical prostatectomies or TURP due to prostate cancer and persistent LUTS, respectively. A total of 441 men in the radical prostatectomy trial were randomly sorted into the intervention ($n = 205$) and control groups ($n = 206$), while 442 men in the TURP trial were assigned to perform post-operative PFME ($n = 220$) or no exercises ($n = 222$). Incontinence was measured using affirmative responses to screening questions from the International Consultation on Incontinence Questionnaire Urinary Incontinence Short Form (ICIQ-UISF) questionnaire. In both trials at the end of the 12-month post-operative period, there was no significant improvement in the rate of urinary incontinence (65% vs. 62%) or in the mean ICIQ score (3.9 vs. 4.0) from men who had performed post-operative PFME. While the authors note an improvement in ICIQ scores at the 3-month period within the intervention group of the radical prostatectomy trial, there was no significant difference between the two groups^[7].

While there seems to be a lack of evidence in support of intermittent post-operative PFME, studies done using daily or weekly pelvic exercises seem to show evidence of improved LUTS in patients. In 2013, Hou et al. randomized 61 patients who received TURP due to BPH into an experimental group ($n = 32$) that performed daily post-operative PFME and a control group ($n = 29$). LUTS outcomes were evaluated using the International Prostate Symptom Score (IPSS score), Medical Outcome Study Short Form 36 Health Survey (SF-36 Survey), and urinary flow parameters (ie, voiding volumes, postvoiding residual urine amount, and maximal urinary flow rate). 12 weeks following surgery, there was a significant difference in LUTS between the two groups, in favor of the post-operative PFME group (3.32 ± 0.84 vs. 6.33 ± 1.77) ($p < 0.001$). In addition, there was an improvement in urinary storage scores (1.94 ± 1.21 vs. 4.81 ± 1.85) ($p < 0.001$), maximal urinary flow (16.41 ± 6.20 mL/s vs. 12.41 ± 7.28 mL/s) ($p = 0.026$), and quality of life scores (54.86 ± 8.62 vs. 49.86 ± 11.23) ($p = 0.029$); ultimately, the authors show that daily PFMEs following TURP can lead to improved LUTS symptoms and quality of life^[8].

TABLE 3 Summary of studies evaluating post-operative PFME.

Study name, year	Design	Surgical intervention	Intervention details	Control group details	Outcomes measured	Key results
Glazener et al., 2011 ^[7]	RCT	(1) Radical prostatectomy or (2) TURP	4 individual sessions with a physiotherapist over 3 months	Did not perform PFME at any point	Primary outcome: Self-reported incontinence using ICIQ-UISF questionnaire	No significant improvement in incontinence in either surgical intervention
Hou et al., 2013 ^[8]	RCT	TURP	Daily PFME for 15 minutes daily for 12 weeks following removal of Foley catheter (<i>n</i> = 30)	No specific PFME instruction (<i>n</i> = 28)	Primary outcome: LUTS symptoms measured by IPSS and SF-36 survey Secondary outcome: Uroflowmetry	Significant improvement in LUTS, urinary flow and storage, and quality of life at 12 weeks
Porru et al., 2001 ^[9]	RCT	TURP	At-home PFME to be done 45 times a day. Three sessions with 15 exercises each (<i>n</i> = 30)	No specific PFME instruction (<i>n</i> = 28)	Primary Outcome: Self-reported incontinence via voiding diary Secondary Outcome: Pelvic floor muscle strength	Post-operative PFME significantly decreased the number of incontinence episodes in the first 3 weeks after surgery. Voiding interval also significantly decreased in post-operative weeks 2 and 3
Chen et al., 2023 ^[12]	Prospective Cohort Study	(1) TURP or (2) AEEP	PFME, biofeedback, and ES twice weekly for 3 months (<i>n</i> = 35)	N/A	Primary Outcome: Incontinence (IPSS and OABSS scores) Secondary Outcomes: Uroflowmetry, pelvic muscle strength	Early post-operative PFME and ES improved pelvic incontinence symptoms and muscle strength

Abbreviations: AEEP, anatomical endoscopic enucleation of the prostate; ES, electrical stimulation; ICIQ-UISF, International Consultation on Incontinence Questionnaire Urinary Incontinence Short Form; IPSS, International Prostate Symptom Score; LUTS, lower urinary tract symptoms; OABSS, Overactive Bladder Symptom Scores; PFME, pelvic floor muscle exercises; RCT, randomized controlled trial; SF-36, Medical Outcome Study Short Form-36 Health Survey; TURP, transurethral resection of the prostate.

Porru et al. found significantly improved voiding intervals and rates of urinary incontinence in men who performed post-operative PFME compared to those who did not conduct PFME at any point. In this study, a total of 58 men were randomly assigned to complete at-home PFME exercises after receiving TURP surgery ($n=30$), while the control group received TURP surgery and did not perform PFME ($n=28$). At weeks 1, 2, and 3 post-surgery, there were significantly fewer episodes of self-reported incontinence in the PFME groups ($p<0.01$). In addition, there was a significant decrease in the voiding interval in the PFME group at weeks 2 and 3 after TURP surgery ($p<0.01$). After four weeks, however, there was no longer a statistically significant difference in the voiding interval^[9].

Recently, Chen et al. showed that post-operative PFME combined with pelvic muscle electrical stimulation (ES) shortened the recovery time of urinary incontinence after prostate surgery and improved symptom severity. The authors conducted a prospective cohort study with 44 patients, a majority of whom had BPH ($n=35$), who received TURP or anatomical endoscopic enucleation of the prostate (AEEP) from January 2019 to December 2020. Before their operation, the participants received baseline scores measuring incontinence rates and urine flow rate, which were later compared to their scores at 1 week, 2 weeks, 1 month, and 3 months post-operation. In the BPH group, pelvic floor muscle strength, measured via a pressure-ball device, showed significant gains across hip flexors, extensors, adductors, abductors, and internal rotators between baseline and 3 months ($p<0.05$). There were significant improvements in incontinence, as measured by IPSS and Overactive Bladder Symptom Scores (OABSS), and uroflowmetry. Urinary incontinence was present in 60% of the BPH cohort at baseline, which later improved to 3% at 3 months post-operatively. In line with these results, pad test leakage decreased from 13.51 ± 17.91 g at baseline to 3.57 ± 20.78 g within 3 months of receiving the operation. Additionally, symptom scores improved significantly: the IPSS declined from a pre-operative mean of 17.91 ± 6.27 , 13.29 ± 6.06 , 9.46 ± 5.34 , 5.94 ± 3.51 , 2.71 ± 1.82 at 1 week, 2 weeks, 1 month, and 3 months, respectively ($p<0.001$). The OABSS followed a similar trend with a baseline mean score of 6 ± 2.62 to 2.51 ± 1.5 ($p<0.001$) by the end of the study. Within two weeks, the maximum urine flow rate significantly improved from 10.82 ± 4.26 to 18.57 ± 7.97 ($p<0.001$), while post-void residual volume decreased from 99.32 ± 111.32 to 41.76 ± 48.97 ($p=0.011$). Both maximum urine flow rate and post-void residual volume continued to have significant improvement until the end of the study when compared to baseline. Overall, early post-operative PFME interventions led to improved pelvic muscle strength, rapid recovery of continence, and improved urinary symptoms in BPH patients after TURP^[12].

4 | DISCUSSION

The analysis of several studies examining PFME in patients undergoing prostate surgeries for BPH reveals varied findings regarding their efficacy in managing urinary incontinence. The synthesis of evidence indicates that intermittent, post-operative PFME appears to lack strong support for improving urinary continence. This suggests that a less structured or sporadic approach to pelvic floor rehabilitation may not yield significant benefits for patients recovering from prostate surgery.

In contrast, studies employing daily or weekly pelvic exercises, especially when initiated early and with additional support, show a more promising trend. These more consistent and intensive regimens demonstrate improvements in LUTS, facilitate the recovery of continence, and lead to better overall urinary symptoms in BPH patients after procedures like TURP or AEEP. One prospective cohort study specifically highlighted that early post-operative PFME improved pelvic incontinence symptoms and enhanced pelvic muscle strength. Furthermore, when PFME was started pre-operatively and continued after HoLEP, it seemed to promote an earlier recovery of continence compared to starting exercises only post-operatively^[11].

Regardless of the statistical outcomes, the findings hold important clinical significance for patients. The observed improvements in LUTS, muscle strength, and the overall recovery of continence with structured and consistent PFME programs suggest a tangible benefit for patients' quality of life^[9,12]. Even if not every study demonstrated a statistically significant difference across all time points, a quicker resolution of incontinence or reduction in symptom severity in the early post-operative period can substantially lessen patient distress and improve their daily functioning. Urinary incontinence after prostatectomy is a common and often bothersome complication, and any intervention that hastens recovery, even without reaching a pre-defined statistical threshold, can be clinically meaningful^[3,12]. For instance, a program that reduces the frequency or severity of leakage, allowing patients to use fewer pads or regain social confidence, directly addresses a critical patient-reported outcome^[3].

Several factors may justify the observed outcomes, both positive and less favorable. The heterogeneity in study designs and outcome measurements across the reviewed literature is a primary consideration. For the positive outcomes, intensity and consistency of training appear pivotal; studies that reported better outcomes often involved "daily or weekly" exercises or an "intensive schedule"^[12]. This consistency likely leads to stronger, better-coordinated pelvic floor muscles. Pelvic floor muscle training strengthens these muscles, increasing their mechanical pressure on the urethra and improving continence^[3]. Furthermore, early intervention is a significant factor, as starting PFME pre-operatively, as seen in some studies, may prepare the

pelvic floor muscles for the surgical trauma and facilitate a more rapid post-operative recovery^[11]. This “prehabilitation” concept could prime the muscles and enhance patient awareness before incontinence even fully manifests^[12]. Additionally, adjunctive therapies like biofeedback and ES appear to be crucial. Biofeedback helps patients accurately identify and contract the correct muscles, while ES can directly stimulate muscle contraction and potentially inhibit unwanted bladder activity and reduce urgency^[3]. Real-time feedback and quantifiable strength measurement, such as with a pressure ball, can also boost patient motivation and compliance, leading to better adherence and, consequently, better results^[12]. The importance of patient education and compliance, ensuring they learn to perform PFME appropriately and consistently, with repeated education, is repeatedly emphasized. A well-understood and diligently followed exercise program is more likely to be effective.

Conversely, several factors can explain the less favorable or inconclusive outcomes. The “lack of evidence in support of intermittent post-operative PFME” suggests that less structured programs may be insufficient to counteract post-surgical UI effectively, as the necessary physiological changes may not occur without adequate intensity or duration^[11]. These inconclusive findings are often compounded by methodological limitations, such as a small number of cases, which can reduce statistical power and the ability to detect significant differences. The absence of objective tests like pad tests in some evaluations, or a lack of standardized outcome measures, also makes it difficult to draw definitive conclusions. A key limitation of this systematic review is the inability to perform a meta-analysis due to the significant heterogeneity between the included studies regarding the timing of PFME and the method of intervention for BPH. Furthermore, the risk of bias assessment (Table 1 and Figure 2) revealed that while most included RCTs demonstrated low to moderate risk of bias, blinding of participants and personnel was challenging, which may introduce performance bias. These findings were considered when interpreting the results; studies with lower risk of bias were given greater weight in our conclusions. Even with instructions, patients’ motivation and compliance with home exercise programs can vary, influencing overall effectiveness. Moreover, the phenomenon of spontaneous recovery can be a confounding factor, as urinary incontinence after prostatectomy often improves spontaneously over time in many men^[3]. This natural recovery trajectory can sometimes obscure the specific benefits attributable to conservative interventions, especially in studies that do not have a robust control group or a placebo intervention^[8]. One study noted that without a control group to compare the effects of PFME with, patients’ improvements could not be entirely attributed to the exercises. Finally, the type of surgery and the resulting UI are critical variables, since different types of prostate surgery (e.g., radical

prostatectomy *vs.* TURP/HoLEP) can result in different types and severities of UI. Stress UI is more common after radical prostatectomy, while urgency UI is more common after TURP^[7]. PFME may have varying efficacy depending on the underlying cause and type of incontinence.

This systematic review presents both agreements and contradictions when compared with the broader literature. The positive effects of early and intensive PFME, especially when combined with ES, on improving incontinence symptoms and recovery time align with previous reports that suggest PFME can accelerate UI recovery^[12]. The results showing early improvement in incontinence episodes are also consistent with some historical experiences of early functional treatment after prostatectomy^[9]. The Cochrane review, while largely cautious, acknowledged that individual small trials indicated potential benefits from electrical stimulation, external magnetic innervation, or combination treatments, although the evidence was limited. It also found some evidence in prevention trials after radical prostatectomy that PFME might lower the chance of incontinence^[3]. However, the findings of no significant benefit from formal one-to-one PFME in the large randomized trial after radical prostatectomy or TURP directly contradict some of the more optimistic findings and a previous systematic review that concluded guided PFMT was associated with superior outcomes^[3]. The Cochrane review’s own conclusion that “there was no evidence that pelvic floor muscle training with or without biofeedback was better than control for men who had urinary incontinence up to 12 months after radical prostatectomy” and that “it seems unlikely that men benefit from one-to-one PFMT therapy after TURP”^[3] strongly supports the non-significant findings of this large trial. Discrepancies may arise from differences in study design, population characteristics, intensity and duration of interventions, and methodological approaches to data analysis. One study also explicitly noted that its finding of pre-operative PFME being beneficial after HoLEP was not consistent with a previous report on TURP, possibly due to insufficient exercise duration or early spontaneous recovery in the comparator study^[11].

Despite the observed heterogeneity and conflicting evidence, conservative approaches like PFME remain a part of current management strategies for post-prostatectomy UI. The findings suggest that the timing and intensity of PFME are crucial for maximizing its effectiveness. Pre-operative initiation of PFME, especially for procedures like HoLEP, appears to support earlier continence of recovery. Similarly, early and intensive post-operative PFME, particularly when enhanced with adjunctive therapies such as electrical stimulation and biofeedback, seems to accelerate recovery and alleviate symptoms. However, in clinical settings where patients already have ready access to general information about PFME, simply offering intermittent one-to-one therapy

sessions may not provide a substantial advantage over existing standard care. This suggests that healthcare resources might be more effectively utilized by focusing on comprehensive patient education regarding correct PFME techniques and by implementing highly motivating, intensive programs that incorporate real-time feedback. For men with persistent severe UI, the high rates of unmet needs persist, indicating that further research is needed to identify optimal management strategies, including the role of surgical interventions, which themselves require rigorous validation through randomized controlled trials. Moving forward, designing robust, adequately powered randomized controlled trials with standardized outcome measures is essential to provide clearer, definitive guidance for clinical decision-making.

5 | CONCLUSION

PFME may play a role in enhancing post-operative recovery of continence and LUTS in men undergoing prostate surgery for BPH, particularly when initiated soon after surgery and performed consistently. Pre-operative PFME shows promise but requires further validation. Heterogeneity in study design, interventions, and outcome measures highlight the need for standardized, large-scale trials to define the optimal timing and protocol for PFME in this patient population.

AUTHOR CONTRIBUTIONS

Mohamed Ramez contributed to the conception and design of the study, acquisition of data, analysis and interpretation of data, and revision of the manuscript. Mohammad Ghassab Deameh, Yasmine Adel Mohammed, Abdelrahman Abdelshafi, and Sidharth Panda were involved in data acquisition, analysis and interpretation of data. Sidharth Panda and Hamza Mohamed drafted the manuscript. Tarek Mohamed contributed to the study conception and design and was also involved in drafting the manuscript.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data used for the analyses in this study are extracted from the original published articles included in the

review, which are publicly available and listed in the reference section.

ETHICS STATEMENT

The authors have nothing to report.

REFERENCES

1. Dumoulin C, Lemieux M-C, Bourbonnais D, Gravel D, Bravo G, Morin M. Physiotherapy for persistent postnatal stress urinary incontinence: a randomized controlled trial. *Obstet Gynecol.* 2004;104(3):504–10.
2. Berghmans LC, Hendriks HJ, BØ K, Hay-Smith EJ, de Bie B, van Waalwijk van Doorn D. Conservative treatment of stress urinary incontinence in women: a systematic review of randomized clinical trials. *Br J Urol.* 1998;82(2):181–91.
3. Anderson CA, Omar MI, Campbell SE, Hunter KF, Cody JD, Glazener CM. Conservative management for postprostatectomy urinary incontinence. *Cochrane Database Syst Rev.* 2015;1(1):CD001843.
4. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gotzsche PC, Ioannidis JPA, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: explanation and elaboration. *BMJ.* 2009;339:b2700.
5. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan-a web and mobile app for systematic reviews. *Syst Rev.* 2016;5(1):210.
6. Luchini C, Stubbs B, Solmi M, Veronese N. Assessing the quality of studies in meta-analyses: Advantages and limitations of the Newcastle Ottawa Scale. *World J Meta-Analysis.* 2017;5(4):80.
7. Glazener C, Boachie C, Buckley B, Cochran C, Dorey G, Grant A, et al. Urinary incontinence in men after formal one-to-one pelvic-floor muscle training following radical prostatectomy or transurethral resection of the prostate (MAPS): two parallel randomised controlled trials. *The Lancet.* 2011;378(9788):328–37.
8. Hou C-P, Chen T-Y, Chang C-C, Lin Y-H, Chang P-L, Chen C-L, et al. Use of the SF-36 quality of life scale to assess the effect of pelvic floor muscle exercise on aging males who received transurethral prostate surgery. *Clin Interv Aging.* 2013;8:667.
9. Porru D, Campus G, Caria A, Madeddu G, Cucchi A, Rovereto B, et al. Impact of early pelvic floor rehabilitation after transurethral resection of the prostate. *Neurourol Urodyn.* 2001;20(1):53–9.
10. Tibaek S, Klarskov P, Lund Hansen B, Thomsen H, Andresen H, Schmidt Jensen C, et al. Pelvic floor muscle training before transurethral resection of the prostate: a randomized, controlled, blinded study. *Scand J Urol Nephrol.* 2007;41(4):329–34.
11. Anan G, Kaiho Y, Iwamura H, Ito J, Kohada Y, Mikami J, et al. Preoperative pelvic floor muscle exercise for early continence after holmium laser enucleation of the prostate: a randomized controlled study. *BMC Urol.* 2020;20(1):3.
12. Chen Y-H, Juan Y-S, Wei W-C, Geng J-H, Chueh K-S, Lee H-Y. Effects of early pelvic floor muscle training on early recovery of urinary incontinence after prostate surgery. *Urol Sci.* 2023;34(1):39–45.