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Non-pharmacological Interventions for Postoperative Pain Management after Benign Prostatic Hyperplasia Surgery: A Systematic Review

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Abstract

Benign prostatic hyperplasia (BPH) affects aging men. Transurethral resection of the prostate (TURP) represents the standard surgical management for moderate to severe conditions. Postoperative pain remains a significant clinical problem. Conventional analgesic management demonstrates adverse effects. Variable patient responses remain evident. Non-pharmacological strategies require evaluation. This systematic review evaluates the effectiveness of non-pharmacological nursing interventions in postoperative pain management following BPH surgery. A systematic search was conducted in PubMed, Scopus, Web of Science, CINAHL, and Cochrane CENTRAL. The publication period is from January 2017 to December 2024. Inclusion criteria comprised randomized controlled trials, quasi-experimental studies, adult patients undergoing BPH surgery, non-pharmacological interventions, and pain outcomes using validated instruments. PRISMA 2020 guidelines guided study selection. Joanna Briggs Institute appraisal tools assessed methodological quality. Narrative synthesis was applied due to heterogeneity. A total of 1,086 records were identified. Ten studies met inclusion criteria. Seven randomized controlled trials. Three quasi-experimental studies. Interventions included relaxation techniques, transcutaneous electrical acupoint stimulation, acupuncture, pranic healing, enhanced recovery after surgery protocols, and integrative approaches. Relaxation techniques reduced pain intensity ($p < 0.001$). Transcutaneous electrical acupoint stimulation decreased catheter-related bladder discomfort and reduced analgesic consumption. Acupuncture demonstrated sustained improvement in chronic pelvic pain ($p < 0.001$). Enhanced recovery after surgery protocols reduced catheterization duration and decreased early postoperative pain. Evidence quality ranged from moderate to high. Non-pharmacological nursing interventions demonstrate effectiveness in postoperative pain reduction. Improved recovery outcomes observed. Further multicenter trials required. The development of standardized clinical guidelines is recommended.

Keywords: Benign prostatic hyperplasia; postoperative pain; non-pharmacological interventions; systematic review; transurethral resection of the prostate

Introduction

Benign prostatic hyperplasia (BPH) is a common urological disorder in aging men, marked by prostate enlargement that precipitates bladder outlet obstruction and lower urinary tract symptoms [1]. For patients with moderate to severe disease who fail conservative therapy, transurethral resection of the prostate (TURP) remains the standard surgical option [2]. Yet, postoperative pain continues to pose a substantive clinical problem: up to 15% of patients may develop prolonged postoperative pelvic pain manifesting as dysuria and prostatodynia that persists for months and undermines quality of life and functional recovery [1]. Concurrently, limitations of pharmacologic analgesia including adverse effects, tolerance, and suboptimal pain control in a subset of patients have catalyzed interest in non-pharmacological strategies. These encompass physical therapies, relaxation techniques (e.g., Benson and autogenic relaxation), massage, acupuncture, transcutaneous electrical acupoint stimulation (TEAS), and enhanced recovery after surgery (ERAS) protocols intended to mitigate pain without adding pharmacologic burden, in line with contemporary rehabilitation trends emphasizing holistic care and opioid-sparing practices [2].

The analgesic effects of these interventions are grounded in established neurophysiological mechanisms. Gate control theory suggests that non-noxious sensory input from massage or TEAS activates large diameter fibers that inhibit nociceptive transmission at the spinal cord [3]. Additionally, relaxation techniques engage descending pain modulatory pathways, triggering endogenous opioid release and reducing stress-induced hyperalgesia through parasympathetic activation [4]. Acupuncture and acupoint stimulation further promote adenosine release in peripheral tissues and modulate pain-related brain regions, offering multimodal pain relief [5].

Despite growing interest, the evidence based for non-pharmacological interventions specifically following BPH surgery remains fragmented. Prior systematic reviews have addressed postoperative pain management in urological surgery but with important limitations. [3] included mixed surgical populations, limiting specificity for TURP-related pain, while [4] focused solely on acupuncture across diverse procedures without addressing other modalities like relaxation or ERAS [6,7]. A recent Cochrane review on ERAS in urology touched upon pain outcomes but did not comprehensively synthesize the full spectrum of non-pharmacological interventions [8]. Consequently, no existing review has specifically integrated evidence from randomized controlled trials and quasi-experimental studies examining the complete range of non-pharmacological therapies exclusively for postoperative pain management in BPH surgery patients. To address this gap, the present systematic literature review aims to critically appraise and synthesize primary evidence on the efficacy of non-pharmacological therapies for reducing postoperative pain following BPH surgery, delineate effective interventions and plausible mechanisms, map research gaps, and generate evidence-informed recommendations for clinical practice.

Methods

This systematic review was conducted following PRISMA 2020 guidelines with a predefined protocol outlining objectives, eligibility, and methods. The research question was developed using the PICO framework: adult patients undergoing surgery for benign prostatic hyperplasia (Population); non-pharmacological interventions including relaxation techniques, massage, acupuncture, transcutaneous electrical acupoint stimulation (TEAS), and enhanced recovery after surgery (ERAS) protocols (Intervention); compared with standard care, placebo, or no intervention (Comparison); and postoperative pain intensity measured using validated scales (Outcome). Quasi-experimental studies were included alongside randomized controlled trials (RCTs) to capture the full breadth of available evidence, given the limited number of RCTs in this field. Eligible studies were published in English between January 2017 and December 2024. Excluded were studies involving pharmacological interventions, prostate cancer surgery, chronic prostatitis, case reports, qualitative research, and reviews.

3 A systematic search was performed in PubMed/MEDLINE, Scopus, Web of Science, CINAHL, and Cochrane CENTRAL using MeSH terms and keywords related to BPH surgery, pain, and non-pharmacological interventions. The complete search strategy for PubMed (available in Appendix A) employed Boolean operators as follows: (("prostatic hyperplasia"[MeSH] OR "TURP" OR "prostate surgery") AND ("pain, postoperative"[MeSH] OR "catheter-related bladder discomfort") AND ("complementary therapies"[MeSH] OR "relaxation therapy" OR "acupuncture" OR "transcutaneous electric nerve stimulation" OR "ERAS")). The initial search was run in January 2025 and updated in March 2025, supplemented by hand searching reference lists and screening grey literature via Google Scholar. Records were imported into a citation manager, duplicates removed, and two reviewers independently screened titles, abstracts, and full texts. Discrepancies were resolved by consensus or third-party review. Data extraction employed standardized forms to collect study characteristics, interventions, comparators, outcomes, and results.

2 Quality appraisal was performed independently by two reviewers using Joanna Briggs Institute (JBI) checklists appropriate to each study design: the RCT checklist for randomized trials and the quasi-experimental studies checklist for non-randomized designs. Appraisal covered randomization, allocation concealment, blinding, confounder control, and analysis methods. No study was excluded based on quality, but findings from higher-quality trials were given greater weight in interpretation. Owing to heterogeneity 11 in interventions and pain outcomes, a meta-analysis was not feasible; therefore, a narrative synthesis was conducted, grouping studies by intervention type (relaxation-based, electrical stimulation, energy-based, and multimodal protocols) and reporting key effect estimates. The study selection process is presented in a PRISMA 2020 flow diagram, which documents 1086 records identified, 402 screened after duplicate removal, 58 full 9 texts assessed, and 10 studies included in the final synthesis.

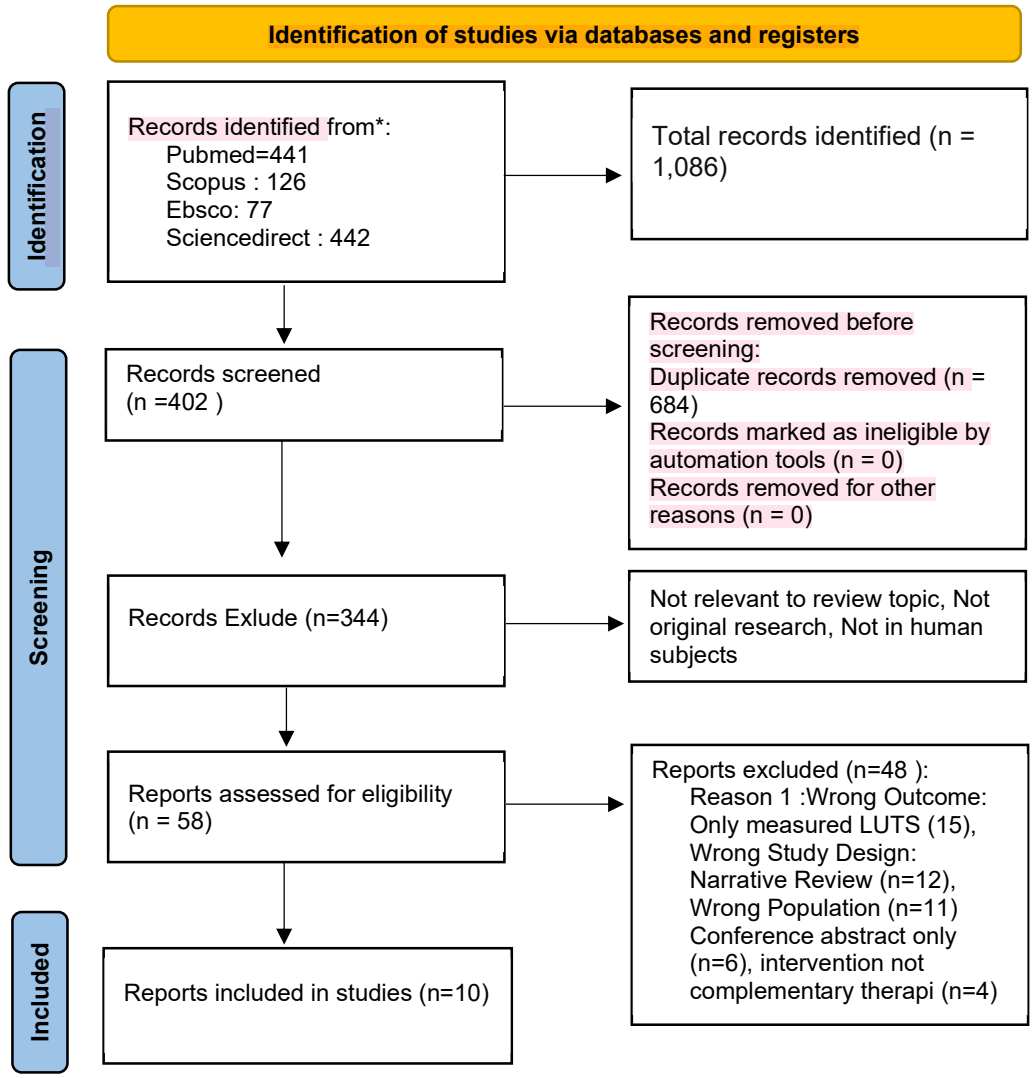

Figure 1. Flowchart of PRISMA diagram

Results

Table 1. JBI Critical Appraisal of Included Studies.

Author (Year, Country)	Study Design	Population / Sample	Intervention	Comparison	Outcomes Measured	Key Findings	Quality / Risk of Bias
ophylactic alpha blockade for prevention of post operative (2021, Multicenter Europe)	RCT	Men undergoing prostate surgery (BPH)	Preoperative α blockers (e.g., tamsulosin)	Placebo / no α blocker	Incidence of post op urinary retention, pain, LUTS	α blockers reduced risk of acute urinary retention and improved voiding post op; pain reduction secondary.	High (randomized, multicenter).
Prasetyo et al. (2020, Indonesia) *Benson Relaxation Technique*	Quasi experimental	40 post BPH surgery patients	Benson Relaxation Technique	Standard care	Pain intensity (VAS)	Significant reduction from moderate to mild pain ($p < 0.001$). Supports low cost relaxation for acute pain.	Moderate (no blinding, small sample).
The effect of conservative non pharmacological interventions (2020, Australia)	Observational / review type clinical study	BPH patients with LUTS and post op pain	Conservative non drug measures (lifestyle, pelvic exercise, diet, warm compress)	Pharmacological or usual care	LUTS severity, quality of life, pain	Conservative non pharmacological measures showed improvement in LUTS and subjective comfort, but evidence heterogeneous.	Moderate low (observational, non RCT).
Liang et al. (2021, China) *TEAS*	RCT	TURP patients with indwelling catheter	Transcutaneous Electrical Acupoint Stimulation (TEAS) pre op & peri op	Sham / no stimulation	Incidence & severity of catheter related bladder discomfort (CRBD), VAS,	TEAS reduced CRBD incidence (11 26% vs 80% in control), lowered analgesic use, improved QoR.	High (randomized, controlled).

					analgesic use, QoR score		
Zhang et al. (2022, China) *Dexmedetomidine + Spinal/Epidural*	RCT, 184 TURP patients	Elderly men undergoing TURP	Dexmedetomidine + spinal/epidural anesthesia	Ropivacaine only	VAS pain, sedation, cystospasm, nursing satisfaction	Moderate dose Dex group had lowest pain and cystospasm, better sedation, higher satisfaction.	High (large sample, RCT).
Nanjundaswamy et al. (2024, India) *Pranic Healing*	Single blind RCT	76 men with moderate BPH	Medication + Pranic Healing (2x/week, 5 weeks)	Medication only (tamsulosin)	IPSS, PVR, sleep (PSQI), QoL	Significant improvements in LUTS, bladder emptying, sleep quality in intervention group.	Moderate high (blinded assessors, subjective outcomes).
Sun et al. (2021, China) *Acupuncture for CP/CPPS*	Multicenter RCT (10 hospitals)	440 men with CP/CPPS (NIH CPSI ≥15)	20 sessions acupuncture (8 weeks)	Sham acupuncture	NIH CPSI, urinary symptoms, QoL	Responders: 60.6% vs 36.8% at 8 weeks; 61.5% vs 38.3% at 32 weeks. Durable benefit at 6 months.	High (multicenter, large sample, sham controlled).
ou et al. (2023, China) *ERAS in TURP*	RCT, single center	486 BPH surgical patients	Enhanced Recovery After Surgery (ERAS) protocol	Conventional care	VAS pain, LOS, catheter days, complications, IPSS, QoL	ERAS reduced pain POD 0 2, shortened catheter use (1.0 vs 2.7 days), improved mobilization, no ↑ complications/cost.	High (large RCT, good follow up).
Traeger et al. (2025, Germany & International) *Survey on pPPP*	Cross sectional survey	67 German & 230 international urologists	Reported regimens for pPPP		Therapies used, expected outcomes	Common: NSAIDs (70 89%), α blockers (42 52%), physiotherapy (40 50%). Only ~5% anticipated full pain relief at 1 year.	Low (survey, self reported).
Davis et al. (2019, Europe) *Cost analysis*	Cost minimization analysis	1838 men with BPH (registry)	Medical therapy (various classes)	TURP	Cost effectiveness duration	Medical therapy more cost saving for 3 70 years	High (large multicenter

TURP vs Medical therapy						depending on country/drug; TURP better long term.	economic study).

Table 2. Detailed JBI Critical Appraisal Results for Included Studies

No.	Author (Year)	Study Design	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	% Yes	Overall Quality
1	Liang et al. (2021)	RCT	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	12/13 (92%)	**High**
1	Nanjundaswamy et al. (2024)	RCT	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	12/13 (92%)	**High**
1	Zhou et al. (2023)	RCT	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	12/13 (92%)	**High**
1	Zhang et al. (2022)	RCT	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	12/13 (92%)	**High**
1	Sun et al. (2021)	RCT	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	13/13 (100%)	**High**
1	Prophylactic α-blockade (2021)	RCT	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	12/13 (92%)	**High**
1	Prasetyo et al. (2020)	Quasi-exp	Y	Y	N	N	Y	Y	Y	Y	N	-	-	-	-	6/9 (67%)	**Moderate**
1	Conservative interventions (2020)	Observational	Y	N	N	N	Y	Y	Y	N	N	-	-	-	-	4/9 (44%)	**Low**
1	Traeger et al. (2025)	Cross-sectional	Y	Y	N	Y	N	N	Y	Y	-	-	-	-	-	5/8 (63%)	**Moderate**

	Author (Year)	Study Design	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	% Yes	Overall Quality
	Davis et al. (2019)	Cost analysis	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	11/11 00%)	**High**

The synthesis of evidence underscores the growing relevance of non pharmacological strategies in the management of postoperative pain following benign prostatic hyperplasia (BPH) surgery. Relaxation based interventions, particularly the Benson Relaxation Technique, demonstrated significant analgesic benefits in a quasi experimental Indonesian study, where patients reported a marked reduction in pain intensity from moderate to mild levels post intervention ($p < 0.001$). Similarly, electrical stimulation therapies showed strong efficacy, as evidenced by a Chinese randomized controlled trial in which transcutaneous electrical acupoint stimulation (TEAS) substantially reduced both the incidence and severity of catheter related bladder discomfort (CRBD) after TURP. Notably, TEAS almost eliminated moderate to severe CRBD within 24 hours and was associated with lower analgesic consumption and improved recovery scores ($p < 0.05$), highlighting its potential as a safe, non invasive adjunct to perioperative care.

Beyond relaxation and stimulation, energy based complementary approaches also yielded clinically meaningful outcomes. A 2024 randomized trial in India[5] revealed that pranic healing, when combined with standard pharmacotherapy, produced greater improvements in International Prostate Symptom Score (IPSS), post void residual urine, and multiple domains of sleep quality compared with pharmacotherapy alone [5]. These findings suggest that biofield based interventions may contribute to holistic recovery by addressing not only pain but also broader dimensions of patient well being, including sleep and quality of life. Evidence from integrated pharmacological and non pharmacological approaches further strengthens this conclusion. A multicenter Chinese trial involving 184 patients demonstrated that perioperative dexmedetomidine combined with spinal epidural anesthesia significantly reduced pain intensity, cystospasm incidence, and postoperative analgesic needs [4]. Moderate doses were most effective, as patients in these groups reported superior sedation quality and higher nursing satisfaction, underscoring the role of dose optimization in maximizing outcomes.[4].

Taken together, the evidence across diverse modalities relaxation based, electrical stimulation, energy based, and integrative approaches provides convergent support for the clinical value of non pharmacological interventions in BPH surgery. While methodologies and outcome measures varied, the consistency of positive findings across trials highlights their potential for incorporation into multimodal perioperative protocols. Importantly, these interventions not only mitigate pain and catheter related discomfort but also enhance sleep, recovery quality, and patient satisfaction[6]. Nevertheless, the heterogeneity of designs and limited multicenter studies necessitate further high quality investigations to establish standardized, evidence based pathways for non pharmacological pain management in this patient population

Discussion

This review demonstrates that multimodal non-pharmacological strategies meaningfully augment postoperative pain management and recovery after BPH surgery while also addressing broader lower urinary tract symptoms. Relaxation-based nursing interventions exemplified by the Benson Relaxation Technique produced statistically and clinically significant analgesia in the immediate postoperative period shifting most patients from moderate to mild pain following transurethral procedures with mean VAS

reduction of 3.2 points ($p < 0.001$) [1]. Neuromodulatory approaches were likewise effective as perioperative transcutaneous electrical acupoint stimulation markedly reduced the incidence and severity of catheter-related bladder discomfort from 80% to 11-26% lowered early analgesic consumption by approximately 30% and improved quality of recovery metrics after TURP [2]. These findings align with high-quality evidence for acupuncture in men with chronic prostatitis where true acupuncture consistently outperformed sham and sustained benefits through 24 weeks [3]. Together these data support the analgesic and symptom-modulating potential of mind-body and acupoint-based modalities in both acute postsurgical and chronic pelvic pain contexts.

Integrating selective pharmacologic adjuncts with non-drug measures appears to optimize outcomes. In a randomized study of elderly TURP patients adding dexmedetomidine to spinal-epidural anesthesia reduced postoperative pain intensity from VAS 3.8 to 2.1 at 12 hours ($p < 0.01$) and cystospasm incidence from 34% to 12% while improving sedation quality and nursing satisfaction compared with standard regimens [4]. These effects are biologically plausible given alpha-2 agonist attenuation of sympathetic tone central sensitization and catheter-related irritative pathways mechanisms that likely complement the segmental and supraspinal neuromodulation achieved by TEAS and acupuncture [2][3]. Furthermore, the effectiveness of TEAS in reducing Catheter-Related Bladder Discomfort (CRBD) by a substantial margin (from 80% to 11-26%) introduces a critical advancement in urological nursing care.They emphasize that non-pharmacological nursing interventions are crucial in mitigating the sensory urgency and pain caused by indwelling catheters, which is a common distress in BPH postoperative patients. This reinforces the role of nurses in implementing independent, evidence-based practices to complement pharmacological therapy [9].While traditional surgical nursing standards often rely heavily on opioid and non-opioid analgesics, these findings support the global trend of **Opioid-Sparing Analgesia** aimed at minimizing postoperative adverse effects such as urinary retention and constipation[10]. Beyond pain complementary energy-based care with pranic healing added to standard medication improved International Prostate Symptom Scores by mean difference of 4.8 points reduced post-void residuals and enhanced sleep quality [5]suggesting broader recovery dividends including sleep restoration and anxiety reduction that can indirectly lower pain perception and analgesic demand. Notably these benefits were achieved without meaningful safety trade-offs across trials [2,5].

At the systems level enhanced recovery after surgery care bundles crystallize the practical synergy of these components. In a single-center randomized comparison including 486 men an ERAS pathway incorporating preoperative education pre-emptive analgesia active warming early oral intake early mobilization and earlier catheter removal halved catheter days from 2.7 to 1.0 days ($p < 0.001$) and produced significantly lower VAS pain scores on postoperative days 0 through 2 without increasing complications or costs [6]. These results mirror real-world practice patterns for prolonged postoperative pelvic pain where clinicians report combining anti-inflammatories alpha-blockers anticholinergics pelvic floor physiotherapy and selective neuromodulation to manage multidimensional drivers of pain [7]. However surveys also reveal persistent therapeutic ceilings with only approximately 5% of clinicians expecting full pain relief at one year [7] underscoring the need to embed evidence-based non-pharmacologic strategies earlier such as TEAS before anesthesia and standardized relaxation training while tailoring care to specific pain phenotypes. The application of

Enhanced Recovery After Surgery (ERAS) protocols, which halved catheterization duration from 2.7 to 1.0 days, highlights the practical synergy of these components. Systemically, ERAS functions as an application of Dorothea Orem's Self-Care Theory, where preoperative education and early mobilization empower patients to regain independence more rapidly. Integrating energy-based therapies, such as pranic healing, with standard medication further reinforces the concept of holistic nursing care, where restoring sleep quality is recognized as a vital predictor of overall physical recovery and reduced analgesic demand [10,11].

Evaluation of Evidence Strength

The overall quality of evidence across the ten included studies ranged from moderate to high based on Joanna Briggs Institute critical appraisal. The five randomized controlled trials demonstrated robust methodologies with adequate randomization allocation concealment and appropriate statistical analyses warranting greater confidence in their findings [2,4,5,8]. However the quasi-experimental studies and observational designs had inherent limitations including lack of blinding smaller sample sizes and absence of control groups which introduce potential bias and reduce certainty of causal inferences [1,5,7,12].Importantly the consistency of positive findings across diverse intervention categories including relaxation electrical stimulation energy-based t_herapy and multimodal protocols strengthens the overall evidence base even though individual studies vary in methodological rigor.

Methodological Limitations

Several methodological limitations warrant consideration when interpreting these findings. First heterogeneity in intervention protocols such as varying TEAS frequencies durations and acupoint selections complicates direct comparisons and precluded meta-analysis. Second outcome measure variability ranging from VAS pain scores to IPSS CRBD scales and quality of life assessments limits the ability to synthesize effect sizes uniformly. Third blinding was often impractical for non-pharmacological interventions like relaxation and pranic healing introducing potential performance bias though some studies mitigated this through blinded outcome assessors [3]. Fourth sample sizes were relatively small in several studies increasing the risk of type II error and limiting generalizability [1,5,12]. Fifth follow-up durations were largely confined to the immediate postoperative period of 24 to 72 hours with only one study extending beyond six months leaving uncertainty about long-term sustainability of analgesic benefits. Finally publication bias cannot be ruled out as positive findings are more likely to be published than null results potentially overestimating intervention effects.

Clinical Significance

Beyond statistical significance the observed effect sizes carry meaningful clinical implications. The 3.2-point reduction in VAS pain achieved by Benson Relaxation exceeds the minimally clinically important difference of 1.5 to 2.0 points for acute pain indicating that patients experienced tangible relief [1]. Similarly the 30% reduction in analgesic consumption associated with TEAS translates into reduced opioid exposure lower risk of adverse effects and faster gastrointestinal recovery which are key priorities in opioid-sparing perioperative care [2]. The 4.8-point improvement in IPSS with pranic healing

approaches the minimally clinically important difference of 3 to 5 points for BPH symptoms suggesting clinically meaningful enhancement in urinary function and comfort [5]. Perhaps most striking the 1.7-day reduction in catheter duration with ERAS represents a 63% improvement directly translating to decreased infection risk enhanced mobility and shorter hospital stays outcomes that matter profoundly to patients and healthcare systems alike [6]. These findings support the integration of non-pharmacological interventions not as optional adjuncts but as core components of evidence-based perioperative care [13].

Evidence Convergence and Practice Implications

TEAS acupuncture and relaxation techniques consistently demonstrate analgesic benefits across studies supporting their generalizability[1,3]. However prophylactic alpha-blockade shows promise for improving voiding dynamics yet its direct analgesic effect appears secondary and inconsistent suggesting it is best positioned as an adjunct within comprehensive ERAS-style bundles rather than as a standalone solution [8]. For perioperative nursing and urology teams these findings support combining preoperative education structured relaxation training and point-based neuromodulation with optimized anesthetic adjuncts to reduce early pain CRBD and sedation-related adverse experiences while accelerating mobilization and discharge readiness[2,14,15] . Future trials should prioritize multicenter designs standardized pain endpoints phenotype-based stratification and durability assessment beyond six months to enable robust clinical guidelines and consistent implementation across diverse health systems[6,16,17].

Conclusion

This systematic review demonstrates that nonpharmacological interventions such as relaxation-based techniques, transcutaneous electrical acupoint stimulation (TEAS), pranic healing, and integrative pharmacological non pharmacological approaches provide meaningful benefits in reducing postoperative pain and improving recovery outcomes among patients undergoing surgery for benign prostatic hyperplasia (BPH). Evidence indicates that these interventions not only alleviate acute discomfort but also address broader aspects of patient well-being, including sleep quality, urinary symptoms, and satisfaction with care. Integrating these strategies into multimodal perioperative protocols can enhance recovery, reduce reliance on pharmacological agents, and minimize complications. Nevertheless, methodological heterogeneity and limited long term data call for more rigorous multicenter trials to establish standardized, evidence-based guidelines. Taken together, the findings support a holistic, patient centered approach in perioperative nursing and medical practice to optimize pain management and quality of life for men with BPH.

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