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A New Frontier in BPE Treatment: Intersection of Pelvic Floor Muscle Training & Luts

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What's known on the subject? and What does the study add?

This study highlights the emerging role of pelvic floor muscle training (PFMT) as an adjunct to medical therapy in managing lower urinary tract symptoms (LUTS) associated with benign prostatic enlargement (BPE). While alpha-blockers remain the cornerstone of treatment, their efficacy may be enhanced by targeting pelvic floor dysfunction, a factor often overlooked in LUTS management. The findings demonstrate that combining PFMT with Silodosin results in superior symptomatic relief, improved urinary flow, and better post-void residual reduction compared to medical therapy alone. Notably, these benefits were observed irrespective of constipation status, suggesting a broader therapeutic implication. Given the significant impact of LUTS on quality of life, this study paves the way for non-invasive, cost-effective strategies to optimise patient outcomes. The results warrant further large-scale trials to validate PFMT as a standard complementary approach in BPE management, potentially reshaping clinical practice and improving patient care.

Abstract

Objective: Lower urinary tract symptoms (LUTS) associated with benign prostatic enlargement (BPE) are common among ageing men. Emerging evidence suggests a strong interplay between pelvic floor dysfunction and LUTS, often exacerbated by underlying constipation, whether clinically apparent or subclinical. Pelvic floor muscle training (PFMT), a well-established intervention for constipation, may offer therapeutic benefits in BPE-related LUTS. However, limited literature exists on its efficacy in this context.

Materials and Methods: This multicentric, prospective, double-arm comparative observational study was conducted over six months at two institutions. Patients with BPE and LUTS were enrolled and divided into two groups. Group I received an alpha-blocker (Silodosin 8 mg) alone, while group II received Silodosin 8 mg plus PFMT. Baseline and post-treatment assessments at six weeks included International Prostate Symptom Score (IPSS), maximum urinary flow rate (Q_{max}), and post-void residual (PVR) volume.

Results: One hundred and ten patients were included (group I: 53, group II: 57). Both groups demonstrated significant improvements in LUTS after six weeks, but group II showed superior outcomes. IPSS reduction was significantly greater in group II (15±4 *vs.* 13±3 in group I, p=0.003). Q_{max} improved more in group II (12.4±1.5 mL/sec *vs.*11.1±0.9 mL/sec, p=0.001), and PVR reduction was more pronounced in this group (71±22 mL *vs.*83±23 mL, p=0.006).

Conclusion: The addition of PFMT to standard medical therapy significantly improved LUTS in patients with BPE. This novel intervention, irrespective of constipation status, enhances urinary outcomes and warrants further investigation through larger clinical trials.

Keywords: BPE, LUTS, PFMT, constipation

Introduction

Up to half of men over 50 and as many as 80% of men over 80 experience lower urinary tract symptoms (LUTS) associated with benign prostatic enlargement (BPE) (1). A significant spectrum of these patients harbour an underlying constipation which many times remains clinically apparent or subclinical. Subclinical constipation refers to individuals who experience constipation symptoms but do not meet the full ROME III criteria for a clinical diagnosis. Studies have shown that managing coexisting constipation in such patients with LUTS may lead to a reduction in International Prostate Symptom Score (IPSS),

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improvement in uroflowmetry parameters, and enhancement of quality of life (QoL) (2).

Pelvic floor muscle training (PFMT) has been recognized as an effective intervention for managing constipation. The pelvic floor muscles play a crucial role in both bowel and bladder function, and improper coordination of these muscles can lead to difficulties in stool passage as well as urinary symptoms. There is a well-established crosstalk between the lower urinary tract and the bowel, where dysfunction in one system often influences the other. For example, constipation can exacerbate LUTS, and vice versa, as both the rectum and bladder share common neural pathways and are affected by pelvic floor muscle tone and coordination. A systematic review found that these interventions improved symptoms in individuals with inflammatory bowel disease experiencing constipation, further demonstrating the interconnected nature of pelvic floor dysfunction and the effectiveness of PFMT in managing these overlapping conditions (3).

What is known on the subject is that LUTS in men with BPE are influenced by multiple factors, including prostate volume, bladder function, and pelvic floor muscle activity. Most existing research focuses on pharmacological and surgical treatments for BPE, with limited emphasis on conservative, non-invasive approaches like PFMT. While PFMT has been extensively studied for post-prostatectomy incontinence and overactive bladder, there is a notable lack of structured clinical studies evaluating its role in BPE-associated LUTS. This gap is significant because a substantial proportion of men with BPE experience LUTS despite standard pharmacotherapy, necessitating adjunctive strategies to enhance treatment efficacy. Moreover, as PFMT is a low-cost, non-invasive therapy with minimal side effects, understanding its potential benefits in BPE management could offer an alternative or complementary approach to conventional medical treatments. Additionally, underlying constipation, whether overt or subclinical, can contribute to LUTS severity by exacerbating bladder dysfunction. Existing literature suggests that addressing constipation may improve LUTS, but limited evidence is available regarding the role of PFMT in this context (3,4).

All these associations suggest that PFMT might play a beneficial role in the management of BPE with LUTS irrespective of the presence or absence of clinically significant constipation. However, the literature has very few studies on this topic. To fill this gap, we conducted a comparative study to assess the role of PFMT in the management of BPE. This is the first prospective study ever conducted on this topic.

Materials and Methods

It was a multicentric, non-randomised, double-arm prospective comparative observational study that was conducted at two institutes over a period of 6 months. Ethics approval was obtained from the Institutional Ethics Committee of the KMC Medical College and Hospital (approval number: IEC/KMC/2025/0476, date: 08.01.2025) before commencement of the study. The study population included the patients with BPE with LUTS who visited the outpatient department. The study included men aged ≥50 years (with or without constipation) with moderate-to-severe LUTS (IPSS >7) and a prostate volume of ≥30 cc, as determined by transabdominal ultrasonography. Constipation was defined using the Rome IV criteria as having at least two of the following in over 25% of defecations: straining, hard/lumpy stools, incomplete evacuation, anorectal obstruction, or the need for manual assistance. Patients must have fewer than three spontaneous bowel movements per week, with symptoms lasting at least three months and starting at least six months prior. Exclusion criteria included patients with urethral stricture disease, active urinary tract infection, neurogenic bladder, the use of per-urethral catheter, and BPE patients who were planned for transurethral resection of the prostate. Proper informed consent was obtained from all the patients included in the study.

Patients meeting the inclusion criteria underwent a comprehensive history-taking and clinical examination, including IPSS scoring. Baseline investigations included uroflowmetry with post-void residual (PVR) volume measurement, ultrasonography of the kidneys, urinary bladder, and prostate, complete blood count, kidney function tests, serum prostate-specific antigen, and urine routine microscopy and culture. The patients were allocated into two groups based on their willingness to participate in PFMT or follow standard medical therapy. This systematic approach ensured that selection bias was minimized.

Group I: Treated with an alpha-blocker (Silodosin 8 mg) alone.

Group II: Treated with an alpha-blocker (Silodosin 8 mg) plus PFMT, irrespective of constipation status.

A formal power analysis was conducted to determine the appropriate sample size for this study, based on detecting a clinically significant difference in IPSS reduction between the alpha-blocker alone (group I) and alpha-blocker + PFMT, (group II) groups. Using G-Power software (Version 3.1.9.7), the calculation was performed with the following assumptions: effect size (Cohen's d) of 0.57 (derived from previous studies on PFMT in LUTS management) (1,2), significance level (α) of 0.05 (two-tailed), statistical power (1-β) of 80%, expected standard deviation of 5 points in IPSS, and a minimal clinically important difference of 2.5 points in IPSS. Based on these parameters, a minimum of 50 patients per group was required. To account for potential dropouts, a total of at least 53 patients per group was targeted.

PFMT was conducted in a structured manner to strengthen pelvic floor muscles and enhance control over urinary and bowel function. Patients were first instructed to identify their pelvic floor muscles by contracting those used to stop urination midstream. Once identified, they practised contraction and relaxation cycles, initially holding contractions for 5 seconds, followed by 5-second relaxations. As their strength improved, contraction duration was increased to 10 seconds. Each set consisted of 10 repetitions, and patients were instructed to perform these sets in both sitting, lying, and standing positions, twice daily (morning and evening). This resulted in a total of 60 contraction cycles per day. Patients were followed up weekly for 3-4 weeks to ensure adherence and correct technique. Participants in the intervention group performed PFMT under supervision, incorporating biofeedback via an electromyographic (EMG) machine to ensure accurate technique and adherence. Via this machine, we were able to establish a baseline tone of the pelvic floor muscles. subsequently, every week, the patients were assessed to see the improvement in the tone of the muscles. Compliance was assessed both quantitatively (frequency and duration of exercises) and qualitatively (correct technique verification via biofeedback).

Follow-up and Outcome Measures

Patients in both groups were reassessed at six weeks using IPSS scores and uroflowmetry with PVR measurements. Baseline and follow-up values were compared to evaluate treatment efficacy. The study algorithm is summarised in Figure 1. The statistical analysis of continuous variables, including IPSS, maximum urinary flow rate (Q_{max}), and PVR, was conducted using paired t-tests within groups and independent t-tests for intergroup comparisons. Effect sizes (Cohen's d) were calculated to determine the magnitude of differences observed. The results demonstrated a statistically significant reduction in IPSS and PVR and a significant increase in Q_{max} in both groups. Additionally, the percentage change in these variables from baseline to six weeks was compared between groups to account for baseline variability, ensuring a more robust interpretation of treatment effects. The chi-square test was used to compare categorical variables.

Results

A total of 110 patients were recruited in the study out of which 53 were included in group I and 57 in group II. With respect to the baseline demographic parameters, there were no significant differences between the two groups in terms of age, IPSS scores, Q_{max}, prostate volume, or transitional zone index (TZI) and PVR values. The average age was 62±13 years in group I and 63±14 years in group II (p-value=0.70). Baseline IPSS scores were 17±6 in group I and 19±5 in group II (p-value=0.07). The mean maximum flow rate (Q_{max}) was 9.6±1.4 mL/sec in group I and 9.1±1.9 mL/sec in group II (p-value=0.12), while PVR was 97±34 mL in group I and 101±35 mL in group II (p-value=0.54). Prostate volume was 35±5 cc in group I and 36±4 cc in group II (p-value=0.34). The TZI was 0.15±0.05 in group I and 0.16±0.04 in group II (p-value=0.41). These results indicated that there were no statistically significant differences between the groups at the start of the study. Around 19 patients in group I and 22 patients in group II had constipation with no statistical difference between the 2 groups (p-value=0.92). The demographic parameters of the patients have been listed in Table 1.

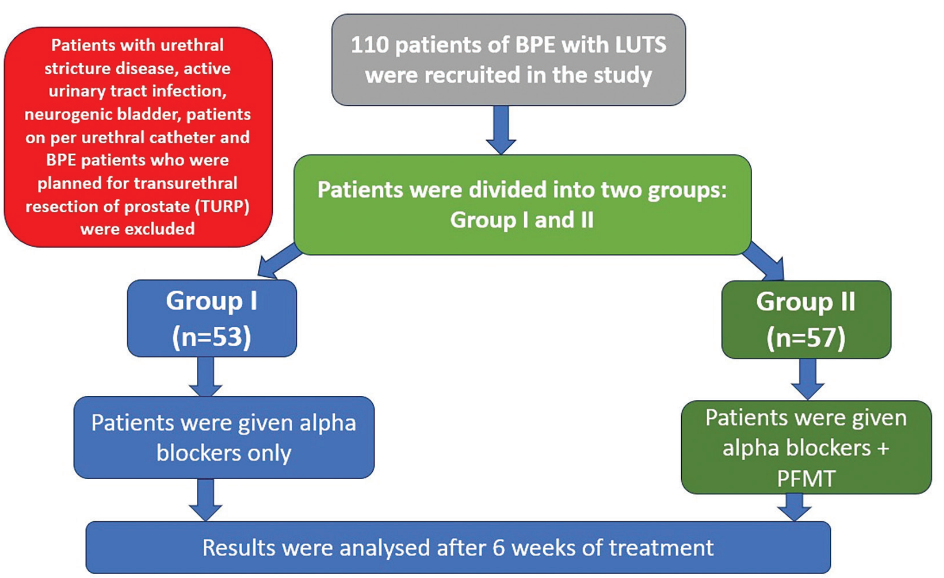

Figure 1. Study algorithm

BPE: Benign prostatic enlargement, LUTS: Lower urinary tract symptoms

Table 1. Showing baseline parameters			
Baseline parameters	**Group I (n=53)**	**Group II (n=57)**	**p-value**
Age	62±13 years	63±14 years	0.70
Constipation	19	22	0.92
IPSS	17±6	19±5	0.07
Q_{max}	9.6±1.4 mL/sec	9.1±1.9 mL/sec	0.12
PVR	97±34 mL	101±35 mL	0.54
IPSS: International Prostate Symptom Score, PVR: Post-void residual, Q_{max}: Maximum urinary flow rate			

After 6 weeks of treatment, significant improvements were observed in both groups across all measured parameters. The IPSS scores were reduced to 15±4 in group I and 13±3 in group II, with a p-value of 0.003, indicating a significant difference in the reduction of symptoms between the groups. In terms of Q_{max}, group I showed an increase to 11.1±0.9 mL/sec, while in group II, it increased to 12.4±1.5 mL/sec, with a p-value of 0.001, reflecting a greater improvement in group II. PVR values decreased to 83±23 mL in group I and 71±22 mL in group II (p-value=0.006), indicating a more significant reduction in group II. The percentage change in IPSS, Q_{max}, and PVR from baseline to six weeks was significantly greater in group II. The results have been summarised in Table 2.

Effect sizes (Cohen's d) were calculated to determine the magnitude of differences, revealing a moderate effect for IPSS reduction (d=0.57), a large effect for Q_{max} improvement (d=1.05), and a moderate effect for PVR reduction (d=0.53). The mean difference between groups was 2 points for IPSS (p=0.003), 1.3 mL/sec for Q_{max} (p=0.001), and 12 mL for PVR (p=0.006), all indicating statistically significant improvements in the PFMT group. Furthermore, percentage changes from baseline to six weeks were analyzed to account for baseline variability, ensuring a more comprehensive assessment of treatment effects.

To assess whether PFMT had a differential effect in constipated versus non-constipated patients, a subgroup analysis was performed. In constipated patients, those receiving PFMT (group II) showed greater improvement in IPSS (ΔIPSS: 6±2 *vs.* 4±1, p=0.01) and Q_{max} (ΔQ_{max}: 3.8±1.1 mL/sec *vs.* 2.9±1.0 mL/sec, p=0.03) compared to those in group I (Silodosin alone). Non-constipated patients in group II also experienced significant symptom improvement compared to group I, but the effect size was more pronounced in constipated patients, suggesting that PFMT may be particularly beneficial in patients with coexisting constipation.

Patients with constipation had lower baseline Q_{max} and higher IPSS scores. The PFMT group exhibited greater improvement in LUTS among non-constipated patients, however, constipated patients also showed a statistically significant reduction in symptoms following PFMT (p<0.05).

Discussion

BPE is a common condition in older men, frequently leading to LUTS such as urinary frequency, urgency, and nocturia. As the global population ages, the prevalence of BPE continues to increase, with up to 50% of men over 50 experiencing LUTS and up to 80% of those over 80 years old affected (1). Notably, the coexistence of constipation, often subclinical, can complicate the management of LUTS. Studies have shown that patients with BPE and LUTS who also experience constipation benefit from managing both conditions simultaneously (2). Constipation, even when subclinical, may exacerbate LUTS due to the shared neural pathways between the lower urinary tract and the bowel. This overlap in dysfunction suggests that addressing both conditions in tandem might improve patient outcomes.

PFMT has emerged as an effective intervention for managing constipation, and more recently, there has been growing interest in its potential role in improving BPE symptoms. The pelvic floor muscles play a crucial role in both bladder and bowel function, with improper coordination contributing to dysfunction in both systems (3). Our study aimed to investigate the role of PFMT in patients with BPE and LUTS, irrespective of the presence of clinically significant constipation, as a first-of-its-kind prospective investigation in this domain.

Table 2. Showing results after 6 weeks of treatment			
Parameters at 6 weeks	**Group I (n=53)**	**Group II (n=57)**	**p-value**
IPSS	15±4	13±3	0.003
Q_{max}	11.1±0.9 mL/sec	12.4±1.5 mL/sec	0.001
PVR	83±23 mL	71±22 mL	0.006
IPSS: International Prostate Symptom Score, PVR: Post-void residual volume, Q_{max}: Maximum urinary flow rate			

The results of our study demonstrate that combining PFMT with standard medical treatment (Silodosin) led to significantly improved outcomes when compared to medical treatment alone. The patients in group II, who received both Silodosin and PFMT, showed a reduction in IPSS scores, improvement in Q_{max}, and a reduction in PVR, compared to the control group, which only received Silodosin. These findings align with previous studies suggesting that PFMT can enhance the effectiveness of pharmacological interventions for LUTS (4,5).

Several studies have highlighted the interconnected nature of pelvic floor dysfunction in both bladder and bowel disorders. A systematic review by Khera et al. (3) demonstrated that PFMT could alleviate functional bowel symptoms in individuals with inflammatory bowel disease, emphasizing the potential of PFMT in managing overlapping dysfunctions between the bladder and bowel (6). This review supports the findings of our study, suggesting that PFMT not only improves bowel function but also positively affects urinary symptoms in patients with BPE.

In another study, Yonguç et al. (2) examined the impact of chronic constipation on LUTS and uroflowmetry parameters in men (7). They found that constipation exacerbates LUTS and negatively affects urodynamic parameters. Their research further supports the hypothesis that addressing constipation may lead to improvements in LUTS, even in the absence of overt constipation. Our study adds to this literature by demonstrating that PFMT, an intervention aimed at improving pelvic floor muscle coordination, can lead to significant improvements in both urinary and bowel function, regardless of the presence of clinically significant constipation.

The benefits of PFMT in the context of BPE may be due to its ability to strengthen the pelvic floor muscles, leading to improved bladder emptying and better control of urinary flow. Studies have shown that strengthening these muscles can increase bladder compliance, reduce detrusor overactivity, and enhance the bladder's ability to empty efficiently, all of which are essential for managing LUTS (8,9). Furthermore, PFMT can reduce the risk of urinary retention, a common complication in patients with BPE (10).

While our study provides valuable insights, it also has limitations that warrant further exploration. The relatively small sample size of 53 patients in group I and 57 in group II may limit the generalizability of the results. Additionally, the short follow-up period of 6 weeks is insufficient to assess the long-term benefits and sustainability of PFMT in managing BPE and LUTS. Larger multicentric studies with longer follow-up periods are needed to confirm our findings and establish PFMT as a standard adjunctive therapy for BPE. Future research should also explore the potential mechanisms through which PFMT improves bladder and bowel function, as well as its long-term effects on symptom relief and QoL (11,12).

Our study supports the hypothesis that PFMT can significantly improve the management of BPE with LUTS, enhancing the effectiveness of pharmacological treatments such as alpha-blockers. The findings suggest that PFMT should be considered as an adjunctive therapy in the management of BPE, particularly for patients with concomitant bowel dysfunction. This study provides compelling evidence that PFMT leads to early improvement in LUTS within six weeks. While long-term efficacy requires further assessment, short-term benefits were clear. A key strength of this study is the integration of EMG biofeedback, ensuring adherence and correct execution of PFMT. The findings indicate that constipation status influences PFMT outcomes, reinforcing the need for holistic management of LUTS.

This study demonstrates that PFMT is a promising adjunctive therapy in the management of BPE with LUTS. The significant improvements observed in the PFMT group, including reductions in IPSS, better uroflowmetry parameters, and lower PVR volumes, highlight the potential of PFMT to enhance the effectiveness of standard pharmacological treatments like alpha-blockers. The findings suggest that PFMT can be particularly beneficial for patients with concurrent bowel dysfunction, as it addresses the interconnectedness of bladder and bowel function. Despite the promising results, further research with larger sample sizes and longer follow-up periods is needed to confirm the long-term benefits and sustainability of PFMT in managing BPE and LUTS. Given its potential, PFMT should be considered as a viable addition to the treatment regimen for BPE, particularly in patients with overlapping bowel dysfunction.

Study Limitations

One key limitation of this study is selection bias due to the non-randomized study design. Patients self-selected into the PFMT group based on their willingness to participate in the intervention, which may have introduced motivational bias, as those more committed to symptom improvement were likely to adhere better to treatment. Additionally, because the study was conducted at two tertiary care centers, the patient population may not be fully representative of community-based or primary care settings, potentially affecting generalizability. Another limitation is the relatively short follow-up period of six weeks, which restricts our ability to assess the long-term sustainability of PFMT benefits. A longer follow-up period (at least six months) would be necessary to evaluate whether improvements in LUTS persist over time. Moreover, although adherence to PFMT was monitored using EMG biofeedback, real-world compliance outside of supervised sessions remains uncertain. Future studies should incorporate objective long-term adherence monitoring to validate the feasibility of PFMT as a routine intervention.

Conclusion

What this study adds to the existing literature is that PFMT, when combined with alpha-blocker therapy, significantly improves LUTS in men with BPE, irrespective of constipation status. This study provides novel insights into the role of pelvic floor rehabilitation in BPE management and supports the integration of PFMT as an adjunctive therapy to pharmacological treatment.

Ethics

Ethics Committee Approval: The study was approved by the Institutional Ethics Committee of the KMC Medical College and Hospital (approval no: IEC/KMC/2025/0476, date: 08.01.2025).

Informed Consent: Proper informed and written consent had been taken from all the patients.

Footnotes

Authorship Contributions

Concept: G.S., P.N., Design G.S., P.N., Data Collection or Processing: G.S., P.N., Analysis or Interpretation: G.S., P.N., Literature Search: G.S., P.N., Writing: G.S., P.N.

Conflict of Interest: No conflict of interest was declared by the authors.

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