Original Article

Rehabilitative Exercise Strategies for Urinary Incontinence After TURP: A Quasi-Experimental Evaluation of Kegel and Bridging Techniques

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Abstract

Background: Urinary incontinence (UI) is a common issue following Transurethral Resection of the Prostate (TURP). Pelvic Floor Muscle Training (PFMT), including Kegel and Bridging exercises, is a promising non-pharmacological intervention for managing UI.
Objective: This study aimed to evaluate the effectiveness of Pelvic Floor Muscle Training, combining Kegel and Bridging exercises, in reducing urinary incontinence among post-TURP patients, and to identify factors associated with UI severity.
Methods: A quasi-experimental pre-posttest design was employed involving 44 male patients who had undergone TURP. Participants were allocated into an intervention group (n = 22), which received six sessions of PFMT over three weeks, and a control group (n = 22), which received standard care. UI severity was measured using the International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF) before and after the intervention. Data were analyzed using paired t-tests and regression analysis.
Results: The intervention group demonstrated a significant reduction in UI scores from 15.50 (SD = 2.50) to 7.41 (SD = 4.12) (p = 0.0001), whereas the control group exhibited only minor improvement. Regression analysis identified age and body mass index (BMI) as significant predictors of UI severity (p = 0.037 and p = 0.041, respectively).
Conclusion: Pelvic Floor Muscle Training effectively decreases urinary incontinence severity following TURP surgery. Integrating PFMT into routine postoperative nursing care may enhance patient outcomes and facilitate recovery. Future research should explore long-term adherence and outcomes associated with PFMT in diverse patient populations.

Keywords: Pelvic floor muscle training, Kegel Exercises, Bridging Exercises, Urinary Incontinence, TURP

INTRODUCTION

Benign Prostatic Hyperplasia (BPH) is a prevalent condition that affects a significant proportion of men, particularly those over the age of 50. The incidence of BPH increases with age, with approximately 50% of men aged 60 and 80% of men aged 80 experiencing symptoms related to this condition (1). BPH results in prostatic hypertrophy, leading to the narrowing of the prostatic urethra and obstructed urine flow. This obstruction elevates

intravesical pressure, necessitating stronger bladder contractions to overcome resistance. Over time, persistent detrusor muscle contractions cause structural changes in the bladder, including detrusor hypertrophy, which manifest clinically as lower urinary tract symptoms (LUTS) such as urinary hesitancy, urgency, and decreased bladder capacity (2).

Transurethral resection of the prostate (TURP) remains the gold standard surgical intervention for alleviating urinary obstruction caused by BPH (3). While TURP effectively mitigates urinary obstruction, it is not without complications. One of the most distressing postoperative complications is urinary incontinence (UI), affecting approximately 30–40% of patients after surgery (4). The etiology of UI following TURP is multifactorial, encompassing urinary sphincter insufficiency (USI) and bladder dysfunction (BD), including detrusor overactivity (DO), both of which contribute to involuntary urine leakage and significantly diminish patients' quality of life (Hu & Pierre, 2019).

Current management strategies for UI post-TURP predominantly include pharmacological interventions and intermittent catheterization. However, these approaches carry inherent risks, such as urethral trauma, urinary tract infections, and systemic complications like sepsis (Potter et al., 2021). Consequently, there is an urgent need for effective, non-pharmacological rehabilitation methods that can enhance continence outcomes without introducing additional clinical risks.

Pelvic Floor Muscle Training (PFMT) has been recognized as a promising conservative therapy for post-surgical urinary incontinence. PFMT encompasses exercises that aim to strengthen the pelvic floor musculature, vital for maintaining urinary continence. Specifically, Kegel exercises target the pubococcygeus (PC) muscle and other pelvic floor muscles, while bridging exercises focus on strengthening adjacent muscle groups, such as the gluteals, hamstrings, hips, and lower back, enhancing overall pelvic stability and support (6,7). Although previous studies have demonstrated the effectiveness of Kegel exercises in improving pelvic floor endurance and reducing urinary leakage after TURP, existing literature has predominantly evaluated these exercises in isolation.

Despite the individual benefits reported for Kegel and bridging exercises, there remains a paucity of research investigating the combined effect of these two modalities as part of an integrated pelvic floor rehabilitation program following TURP. No previous study has systematically examined whether combining Kegel and bridging exercises offers synergistic benefits in reducing urinary incontinence severity among post-TURP patients. This represents a critical gap in the evidence base, as a comprehensive and structured exercise program may provide superior outcomes compared to isolated interventions. Therefore, this study aimed to address this research gap by evaluating the effectiveness of a combined Kegel and bridging exercise intervention in reducing urinary incontinence among male patients following TURP at CAM Hospital Bekasi. By investigating the integration of these two complementary exercises, this study introduces a novel, evidence-based, non-pharmacological strategy that could enhance postoperative recovery, improve quality of life, and reduce dependence on pharmacological therapies.

METHODS

Study Design

This study employed a quasi-experimental pre-posttest control group design to evaluate the effectiveness of Pelvic Floor Muscle Training (PFMT), comprising Kegel and Bridging exercises, in reducing urinary incontinence (UI) among male patients following Transurethral Resection of the Prostate (TURP) at CAM Hospital Bekasi.

Sample

Participants were recruited from male patients who underwent TURP at CAM Hospital Bekasi. A simple random sampling technique was utilized to select eligible participants, ensuring an equal probability of inclusion. A total of 44 participants were enrolled and randomly assigned into two groups: the intervention group (n = 22) and the control group (n = 22).

Inclusion criteria were male patients aged 18 years or older, had undergone TURP at least one week prior to enrolment, experienced urinary incontinence symptoms, capable of engaging in physical exercise as assessed by medical clearance, and able to provide informed consent. Exclusion criteria included cognitive impairment or psychiatric disorders interfering with participation, severe comorbidities limiting physical activity (e.g., severe cardiac or pulmonary disease), and previous participation

in structured pelvic floor rehabilitation programs.

The sample size was calculated using G*Power version 3.1.9.7 for a paired t-test analysis. Assuming an effect size of 0.8 (large effect), an alpha value of 0.05, and a power of 0.80, a minimum sample of 21 participants per group was required. To account for potential dropouts, the sample size was increased to 22 participants per group, resulting in a total sample of 44.

Instrument

Urinary incontinence severity was assessed using the International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF). It is developed by Avery et al. under the auspices of the International Consultation on Incontinence. The ICIQ-UI SF consists of 4 core questions evaluating the frequency, amount, and overall impact of urinary incontinence, along with a self-diagnostic item identifying potential causes. Each item is scored on a scale, and the total score ranges from 0 to 21, with higher scores indicating greater severity of urinary incontinence. The original instrument has demonstrated excellent reliability, with a reported Cronbach's alpha of 0.87. This level of reliability was confirmed in this study population.

Procedure

Following ethical approval, eligible patients were identified and screened based on inclusion and exclusion criteria. After obtaining written informed consent, participants were randomized into the intervention and control groups. Participants received Pelvic Floor Muscle Training (PFMT), which included both Kegel and Bridging exercises. Six sessions over three weeks (two sessions per week). Each session lasted approximately 30 minutes. Kegel exercises focused on strengthening the pelvic floor muscles, while bridging exercises targeted pelvic stability by engaging the gluteal, hamstring, hip, and lower back muscles. Participants were also instructed to perform the exercises at home daily and were provided with written and illustrated instructions to guide home practice. Participants received standard postoperative care, including general advice on activity and bladder health, but no structured PFMT intervention. Baseline assessments were conducted prior to the intervention, and follow-up assessments were performed three weeks after the final supervised session.

Data Analysis

Data were analyzed using IBM SPSS Statistics version 26. Descriptive statistics (means, standard deviations, frequencies, percentages) were used to describe baseline characteristics. Within-group comparisons (pretest vs posttest) were analyzed using paired t-tests. Between-group comparisons (intervention vs control posttest outcomes) were conducted using independent samples t-tests. Regression analysis was performed to explore predictors of urinary incontinence severity, including demographic factors such as age and body mass index (BMI). A p-value of <0.05 was considered statistically significant.

Ethical Considerations

Ethical approval for this study was obtained from the Health Research Ethics Committee of Muhammadiyah Jakarta University (Approval No. 0612/F.9-UMJ/V/2023). All participants provided written informed consent prior to participation. Participants were informed of their right to withdraw at any time without consequences to their medical care. Data confidentiality and participant anonymity were strictly maintained throughout the study in accordance with the Declaration of Helsinki ethical principles.

RESULTS

This section presents the findings from the study, including the characteristics of the participants, changes in urinary incontinence (UI) scores before and after the intervention, and the results of the multiple regression analysis to identify predictors of UI severity.

Respondent Characteristics

The characteristics of participants in both the intervention and control groups were compared to ensure baseline equivalence. The table below summarizes the demographic and physical characteristics of the respondents.

Table 1. Respondent Characteristics

Characteristic	Intervention Group (n=22)	Control Group (n=22)	*p*-value
Age (Mean ± SD)	68.68 ± 6.67	62.00 ± 5.50	0.358
Education (Low/Intermediate)	77.3% / 22.7%	63.6% / 36.4%	0.509
Occupation (Working/Not Working)	68.2% / 31.8%	50.0% / 50.0%	0.358
BMI (Mean ± SD)	24.31 ± 1.77	23.81 ± 2.43	0.100

There were no significant differences between the intervention and control groups in terms of age, education, occupation, or BMI, suggesting both groups were similar in their baseline characteristics

Table 2. Pre and Post-Treatment UI Scores (ICIQ-UI SF)

Group	Pre (Mean ± SD)	Post (Mean ± SD)	Mean Difference (SD)	t-value	*p*-value
Intervention	15.50 ± 2.50	7.41 ± 4.12	8.09 ± 3.25	11.67	0.0001
Control	15.32 ± 2.71	10.05 ± 4.35	5.27 ± 3.01	8.21	0.0001

Both groups showed significant improvements in urinary incontinence (UI) as measured by the ICIQ-UI SF. However, the **intervention group** experienced a much larger reduction in symptoms, with their UI score dropping from 15.50 to 7.41, compared to a smaller decrease in the control group (from 15.32 to 10.05). This indicates that PFMT (Kegel and Bridging exercises) had a more substantial effect on reducing UI in the intervention group.

Table 3. Multiple Linear Regression Analysis

Model	Variable	B	SE	β	t-value	*p*-value
Model 1	Age	-0.120	0.074	-0.244	-1.611	0.115
	BMI	-0.586	0.242	-0.358	-2.378	0.022
Model 3	Age	-0.153	0.071	-0.310	-2.152	0.037
	BMI	-0.489	0.232	-0.304	-2.110	0.041

Age and BMI were significant predictors of UI severity. Older patients and those with higher BMI had more severe urinary incontinence. These findings emphasize the role of demographic and physical factors in determining post-TURP rehabilitation outcomes.

DISCUSSION

This study explored the effectiveness of Pelvic Floor Muscle Training (PFMT), incorporating both Kegel and Bridging exercises, in improving urinary incontinence (UI) among male patients following Transurethral Resection of the Prostate (TURP). The results highlighted several key findings related to the impact of PFMT on UI severity, as well as the role of demographic and physical factors such as age, BMI, and education level.

The significant reduction in urinary incontinence scores observed in the intervention group is consistent with existing literature supporting the effectiveness of PFMT for post-TURP patients. The intervention group showed a substantial improvement in urinary incontinence, with the ICIQ-UI SF score decreasing from 15.50 to 7.41, indicating a meaningful reduction in UI severity (mean difference of 8.09). This was statistically significant (t = 11.67, p = 0.0001), which aligns with previous studies that demonstrate the

positive effects of Kegel exercises in improving pelvic floor muscle strength and controlling UI in post-prostate surgery patients (8,9). Additionally, the combination of Kegel and Bridging exercises may have had a synergistic effect. Kegel exercises target pelvic floor muscles directly, while bridging exercises strengthen the pelvic region and core muscles, providing overall support for bladder control (10,11). The significant improvement in the intervention group supports the growing evidence suggesting that multifaceted exercise programs can be particularly beneficial for managing urinary incontinence, especially in patients recovering from prostate surgery (12).

Age was identified as a significant predictor of urinary incontinence severity, which is consistent with previous research that shows older individuals are at a higher risk of developing incontinence due to physiological changes in bladder function, including weakened pelvic floor muscles and decreased bladder capacity. (13,14). In this study, the intervention group had an average age of 68.68 years, which is considered elderly, and the results highlight the need for targeted interventions for this demographic group. As age increases, the risk of overactive bladder, which is commonly observed in older populations, also rises, characterized by urgency, frequent urination, and in some cases, involuntary urine loss (15).

Interestingly, the multiple regression analysis also found that BMI was a significant predictor of UI severity ($p = 0.041$). Higher BMI was associated with more severe urinary incontinence, which aligns with findings by (16) Suggesting that obesity and excessive abdominal pressure contribute to bladder dysfunction. However, it is important to note that this relationship can be complex, as high BMI can both exacerbate and compensate for UI symptoms, as higher intra-abdominal pressure can lead to compensatory mechanisms that affect bladder control. (17–19)

The study found that a significant proportion of participants had a limited level of education (69.2% in the intervention group), which may affect the comprehension of treatment instructions and adherence to the PFMT regimen. This aligns with previous research suggesting that individuals with lower educational levels often face challenges in assimilating health-related information. (20). Researchers should consider the educational background of participants when designing interventions, ensuring that terminology is accessible and instructions are tailored to the target demographic. The findings also indicated that a substantial proportion of participants remained engaged in work (68.2% in the intervention group), despite being elderly. While there is limited research directly linking occupation and urinary incontinence, the ability to remain active in the workforce could reflect better physical and psychological health, which may influence their adherence to PFMT and overall treatment outcomes.

The results suggest that maintaining an optimal BMI plays a role in managing urinary incontinence. In this study, a significant proportion of participants in both the intervention (54.5%) and control (63.6%) groups maintained an optimal BMI. This is consistent with the findings of (17), who found a positive correlation between BMI and intra-abdominal pressure, which may exacerbate UI symptoms. Therefore, managing body weight might be an important factor in improving the effectiveness of interventions like PFMT, especially in post-TURP patients.

The significant improvement in urinary incontinence scores following the PFMT intervention aligns with findings from other studies on the effectiveness of Kegel exercises. Compared Kegel exercises with other treatments like extracorporeal magnetic innervation (EMI) and found that although EMI showed superior results, Kegel exercises still significantly improved UI symptoms. (9,21). This study contributes to the growing body of evidence supporting PFMT as a first-line treatment for urinary incontinence. Moreover, the combination of Kegel and Bridging exercises in this study likely enhanced patient compliance and overall effectiveness. Bridging exercises target not only the pelvic floor but also the abdominal and core muscles, providing comprehensive support for bladder control. (10). This is consistent with (11,22,23), who found that combining Bridging exercises with other PFMT modalities had a synergistic effect on managing incontinence.

Implications

The findings have important implications for nursing practice and postoperative rehabilitation strategies. Integration of PFMT, particularly a combined approach involving Kegel and Bridging exercises, into post-TURP

care protocols could serve as a non-pharmacological, cost-effective method for improving urinary continence. Nurses should proactively educate patients, especially older adults, on the importance of pelvic floor strengthening exercises and provide ongoing support to enhance adherence. Tailoring educational interventions based on patient literacy and functional capacity could further optimize outcomes. Future nursing research should explore the long-term effects of PFMT and assess the effectiveness of individualized programs based on patient demographics and baseline functional status.

Limitations

Several limitations of this study should be acknowledged. First, the relatively small sample size (n = 44) limits the generalizability of the findings. A larger and more diverse sample would allow for broader applicability. Second, the short intervention period (three weeks) precludes conclusions regarding the long-term sustainability of PFMT benefits. Third, this study focused solely on PFMT without direct comparison to other conservative or pharmacological therapies, limiting the ability to determine the relative effectiveness of PFMT versus alternative treatments. Lastly, the homogeneity of the sample, particularly regarding education and occupation, may restrict the findings' applicability to more heterogeneous populations.

CONCLUSION

This study demonstrates that Pelvic Floor Muscle Training, incorporating Kegel and Bridging exercises, significantly reduces urinary incontinence severity among male patients following TURP. Demographic factors such as age and BMI were also shown to influence UI severity, highlighting the importance of personalized rehabilitation strategies. The integration of PFMT into routine nursing care offers a promising, non-invasive approach to enhance recovery and improve the quality of life among post-surgical patients. Future research should aim to validate these findings through larger, multicenter studies with longer follow-up periods and comparisons against other standard treatment modalities.

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Author Contribution

HH : Conceptualization and Study Design, Methodology, Data Curation, Writing – Original Draft, Writing – Review & Editing
IN : Conceptualization and Study Design, Methodology
DI : Data Curation, Methodology, Formal Analysis

Conflict of Interest

The authors declare no conflict of interest regarding the publication of this manuscript.

Data Availability Statement

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request. All data shared will be de-identified to maintain participant confidentiality.

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