RESEARCH PAPER

The Efficacy of Behavioral Therapy in the Treatment of Stress Urinary Incontinence in Middle Aged Women

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Received: 28th Feb, 2026; Revised: 6th March 2026; Accepted: 7th April, 2026; Available Online: 20th April, 2026

ABSTRACT

Background: Stress urinary incontinence (SUI), a prevalent condition and significantly impacts physical and emotional health of women . Pelvic floor muscle training (PFMT) is a common first line treatment, many women find it difficult to recruit the pelvic floor muscle effectively and struggle with maintaining consistency. Additional approaches such as behavioural therapy and multimodal therapy are often needed to support and achieve better outcomes.

Aim: To assess the effectiveness of behavioural therapy in reducing the symptoms of stress urinary incontinence (SUI) in middle-aged women.

Objective: To evaluate the effect of behavioural therapy on stress urinary incontinence symptoms and pelvic floor muscle strength in middle-aged women.

Methodology: 40 middle aged women with SUI using QUID were separated into two groups, the control group (n=20) performed PFMT with abdominal strengthening exercise, whereas the experimental group (n=20) participants pelvic floor muscle, abdominal strengthening exercise along with behavioural therapy for five days a week for eight weeks. The assessments were taken on date of recruitment and at the end of eight weeks. PFM strength was assessed with PERFECT scale and severity of symptoms was measured by using ICIQ-UI SF questionnaire and follow up ensured.

Result and Discussion: Both groups showed reduction of symptoms severity after the intervention, reflected as better QUID, ICIQ-UI SF and PERFECT scores. However, the experimental group demonstrated notable progress in pelvic floor muscle endurance (p=0.005) and fast contractions (p=0.011), QUID (p=0.003), ICIQ-UI SF severity (p=0.003) & ICIQ-UI SF QOL (p=0.006).

Conclusion: The behavioral therapy combined with pelvic floor muscle training is effective in reducing symptoms in women with SUI and enhance PFM muscle performance and contribute the overall quality of life. The combined approach supports a comprehensive rehabilitation strategy.

Keywords: Stress urinary incontinence, pelvic floor muscle training, behavioral therapy, pelvic floor muscles, middle-aged women, physiotherapy, exercises.

How to cite this article: Roshini R, Sathyaprabha B, Ponmathi P, Apoorva HT. The Efficacy of Behavioral Therapy in the Treatment of Stress Urinary Incontinence in Middle Aged Women. Int J Drug Deliv Technol. 2026;16(39s): 263-270. DOI: 10.25258/ijddt.16.39s.30

Source of support: Nil.

Conflict of interest: None

INTRODUCTION

Urinary incontinence (UI) is a common underreported condition that significantly affect a woman's physical health, emotional well- being, social life. Among its different types, stress urinary incontinence (SUI) is most common subtype. It is typically described as leaking of urine involuntarily during activities such as coughing, sneezing, exercising [1,2]. Globally, SUI is estimated to affect around 25%-45% of women, with higher rates observed in middle-aged and older population [3.]

The condition is largely associated with dysfunction of the pelvic floor muscle (PFM) and reduced support to the urethra and bladder neck. Factors such as pregnancy, vaginal delivery, hormonal changes during menopause, and the natural aging process can lead to structural and neuromuscular changes. These changes weaken PFM and

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reduce tissue elasticity, ultimately affecting body's ability to maintain proper urethral closure during increased abdominal pressure, which results in urine leakage. [4]

PFMT, commonly known as Kegel's exercises, is widely recognized as a first-line conservative treatment for stress urinary incontinence. It improves muscle strength, endurance, and coordination, thereby enhancing urethral support and control. Exercise-based rehabilitation protocols often focus on improving pelvic floor muscle function and integrating muscle activation into daily activities [2,5.] Most of the patients do not effectively recruit their pelvic floor muscles while performing Kegels and require a therapist supervision. Sung Tae Chol et.al. (2021) concluded that PFMT was the most effective when performed under the supervision of a therapist with a biofeedback device to improve PFM strength in women with SUI [5]

Alime Buyuk1 et.al. (2021) observed that PFMT and Behavioral training (BT) reduced the symptom severity of pelvic floor dysfunction in elderly women.[6] BT, along with PFMT, has shown improvement in physical activity levels, quality of life, and reduction in symptom severity among elderly women. Behavioral interventions actively involve patients in modifying lifestyle habits to improve bladder control. It is a low-risk, cost-effective, and easily accessible therapeutic option [2].

The core components of behavioral training include bladder retraining, scheduled voiding, fluid and dietary management, weight reduction strategies, bowel regulation, and patient education regarding pelvic floor awareness. Bladder retraining aims to gradually increase the interval between voids to improve bladder capacity and reduce urgency. Scheduled voiding is often helping patients gradually develop better bladder control. Simple changes in fluid intake and diet, such as reducing caffeine and carbonated beverages, can make a noticeable difference by decreasing bladder irritation. Managing body weight is an important part of recovery and it reduces the physical load on the intra-abdomen and constantly reduce the strain on the pelvic floor muscle. Keeping regular bowel habits is necessary to avoid constipation, which can otherwise overstretch and weaken this muscle more. The lifestyle changes of the patient help to improve the patient's confidence. Previous research describes how these behavioural changes, significantly improve the QoL and reduce symptom severity for women dealing with SUI. [2,11.]

However, several practical difficulties limit the effectiveness of conservative management approaches. Many women experiences embarrassment and social stigma leading to delay reporting, poor treatment adherence. Limited awareness regarding correct PFM contraction technique reduces the effectiveness of unsupervised home program. In addition of access to specialised physiotherapist, time constraints, and poor long-term motivation may affect compliance. BT requires patient to actively participate in making lifestyle modifications and can be challenging without guidance and follow up therefore addressing these constraints would help improve the treatment outcomes in women with SUI.

Majority of the evidence have explored the effects of pelvic floor muscle training and behavioural therapy separately, limited studies have assessed the combined effects of pelvic floor muscle training and BT in symptom severity and pelvic floor muscle strength, particular in middle aged women with SUI. Therefore, this study fills that gap, focusing on middle-aged women, its structured behavioral training approach, that measures both how the patient feels and how the muscles are performing. This may contribute valuable evidence toward cost effective and non-invasive management strategies in clinical physiotherapy practice.

MATERIALS AND METHODS

Type and Location of the study:
This was an experimental study conducted among middle-aged women diagnosed with stress urinary incontinence. The study was carried out at Sri Ramachandra Hospital (g-Block), in the outpatient clinics of the Department of Obstetrics and the Department of Urology. The total duration of the study was eight weeks.

Subjects and Sample Selection

Participants were recruited using a convenience sampling method based on predefined eligibility criteria. Women diagnosed with stress urinary incontinence who attended the outpatient clinics during the study period were considered for inclusion.

For the sample size estimation, the following statistical assumptions were applied: a Type I error (α): 0.05 corresponding to a 95% confidence level, and a statistical power (1−β): 0.80 (80% power)[18]. 20 participants were included in each group, resulting in a total sample size of 40.

Inclusion criteria:
- Women between the aged 45–59 years of age.
- Clinically diagnosed with stress urinary incontinence
- Not currently engaged in any pelvic floor rehabilitation programme.
- Women who give willingness to participate in the study.
- Able to understand and follow verbal commands or instructions.

Exclusion criteria:
- Mixed or urge urinary incontinence
- Pregnancy or postpartum (within 6 months).
- Women with severe cardiovascular problems, neurological issues, severe musculoskeletal problems
- Neurological conditions affecting bladder control (e.g., multiple sclerosis, spinal cord injury).
- Those with pelvic organ malignancy, undergoing radical surgery for pelvis, sling or prolapse surgery.

PROCEDURE:

Participants were initially screened using the Questionnaire for Urinary Incontinence Diagnosis (QUID) to diagnose SUI. Participants who met the selection criteria were divided into control group and the experimental group via convenience sampling, with 20 participants in each group. The control group received pelvic floor muscle training (PFMT) along with abdominal strengthening exercises, whereas the experimental group received behavioral therapy in addition to PFMT and abdominal strengthening exercises. The intervention program was carried out for a duration of eight weeks, with sessions conducted five days per week. Three monitored sessions conducted for both the groups. Baseline and post intervention assessments (8 weeks) were performed using the PERFECT scale for assessing pelvic floor muscle strength and the International Consultation of Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF) to assess symptom severity and its impact on quality of life. Follow up was carried out via a structured online session and phone calls for participants without internet access. Additionally, educational handouts with details of the exercises and behavioral training were provided in Tamil and English.

Treatment protocol:

Kegels- Starting in a supine position, then progressing to a sitting position and standing position- **First 2 weeks Supine**: 10 contractions of 5 secs, 15 contractions of 3 secs, 20 contractions of 1 sec., and 5 contractions while coughing. **Next 2 weeks**: **Supine Position**: 10 contractions of 5 secs, 15 contractions of 3 secs, **sitting:** 20 contractions of 2 seconds, 20 contractions of 1 sec., 5 contractions while coughing. **Following 2 weeks: Sitting**: 10 contractions of 5 secs, 15 contractions of 3 secs, **standing:** 20 contractions of 2 seconds, 20 contractions of 1 sec., 5 contractions while coughing. **Last 2 Weeks: Standing Position**: 10 contractions of 5 secs, 15 contractions of 3 secs, 20 contractions of 2 seconds, 20 contractions of 1 sec., and 5 contractions while coughing[2].

Abdominals- Teach correct activation of the abdominal muscles retraction of the abdomen performed during the expiration while the pelvic and torso area remained stable[2].

Activation exercises of the transversus abdominis muscle performed in different positions: with the subject lying on the back with bent and straight legs; lying on the abdomen; on the knees with the hands placed on the ground; standing with the body and shins insignificantly bent and with the arms resting on the thighs; walking; and climbing the stairs.(10 time 3 sets)

Behavioral therapy- Week 1: Female reproductive and urinary system anatomy. PFM anatomy and functions.

Week 2: UI types and risk factors. Bladder irritating food.

Week 3: Appropriate frequency and urinary habits. Position to urinate and expel.

Week 4: PFM pre-contraction techniques . UI exercise adherence[1].

RESULTS:

SPSS Version 24.0 was used to analyse the statistical data. Baseline characteristics were calculated using descriptive statistics. Normality of data was assessed with Shapiro-Wilk test. Significance level was calculated as $p<0.05$. Wilcoxon signed rank test was used for within-group analysis whereas Mann-Whitney U test was used for between-group analysis.

Within-Group Analysis

Control Group

Significant improvements were observed in urinary incontinence outcomes. The QUID score significantly decreased from 12 to 11 ($p = 0.018$), indicating reduction in urinary symptoms. The ICIQ-UI-SF severity score also showed a significant reduction from 10 to 8 ($p = 0.022$), reflecting decreased severity of incontinence.Statistically no significant improvements were observed in pelvic floor muscle function parameters.

Experimental Group

In the experimental group, statistically significant improvements were observed in selected pelvic floor muscle parameters. Endurance improved significantly from a median of 3 to 4 ($p = 0.005$), and fast contractions showed a marked increase from 3 to 5 ($p = 0.011$).

The QUID score decreased from 13 to 9 ($p = 0.003$). The ICIQ-UI-SF severity score improved from 11 to 7 ($p = 0.003$), and the ICIQ-UI-SF QOL score improved from 4 to 3 ($p = 0.006$), indicating reduced symptom severity and enhanced quality of life.

Between-Group Analysis

A significant difference was observed in fast contractions ($p=0.009$), with the experimental group showing better improvement than the control group. The QUID scores showed a significant improvement ($p<0.001$) in the experimental group. Both ICIQ-UI SF severity ($p=0.003$) and quality of life ($p=0.003$) scores improved significantly when compared to the control group.

Table 1: Baseline characteristics:

VARIABLES (N=40)	CONTROL GROUP (CG) (n=20)	INTERVENTIONAL GROUP(IG) (n=20)
Age(years)	51.82 ± 6.21	52.7 ± 5.47
BMI (kg/m²)	26.03 ± 2.67	29.45 ± 3.63
Waist - Hip Ratio	1.16 ±0.03	1.17 ± 0.01
Parity (multiparous)	11(100%)	11(100%)
Mode of Delivery (SVD)	9(81.8%)	10(91.0%)

(LSCS)	2(18.2%)	2(18.2%)
Occupation Employed	10(91.0%)	5(45.4%)
Unemployed	1(9.0%)	6(54.6%)
Education Graduate	6 (54.6%)	8 (72.8%)
Schooling (high school / higher secondary)	5 (45.4%)	3 (27.2%)

Table 2: Within Group Analysis (Cg)

CONTROL GROUP(n=20)	PRE-TEST	POST-TEST	P-VALUE
	MEDIAN (IQR)	MEDIAN (IQR)	
Power	2(0.50)	2(0.50)	1.000
Endurance (Sec)	3(1.00)	3(1.50)	0.886
Repetition	3(1.00)	3(1.00)	0.876
Fast Contraction	3(0.50)	3(1.00)	0.105
QUID	12(1.50)	11(1.00)	0.018
ICIQ-UI-SF severity	10(1.50)	8(1.00)	0.022
ICIQ-UI-SF QoL	4(0.00)	4(0.00)	1.000

Wilcoxon Signed Rank Test - (P<0.05)

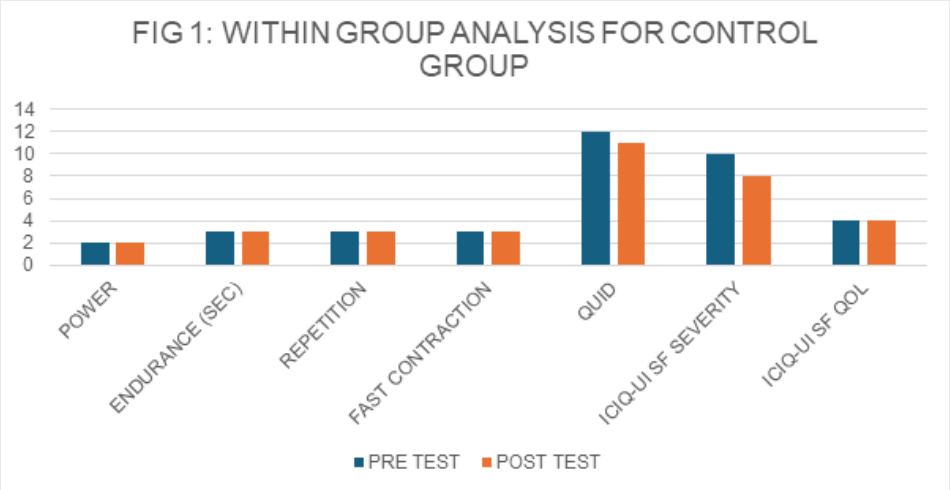


Table 3: Within Group Analysis (Eg)

EXPEREMENTAL GROUP(N=20)	PRE-TEST	POST-TEST	P-VALUE
	MEDIAN (IQR)	MEDIAN (IQR)	
Power	2(0.000)	2(0.000)	0.346
Endurance (SEC)	3(1.000)	4(1.000)	0.005
Repetition	3(1.000)	3(1.000)	1.000
Fast Contraction	3(0.000)	5(2.000)	0.011
Quid	13(1.000)	9(1.500)	0.003
ICIQ-UI-SF Severity	11(1.000)	7(0.000)	0.003
ICIQ-UI-SF Qol	4(1.500)	3(0.500)	0.006

Wilcoxon Signed Rank Test - (P<0.05)

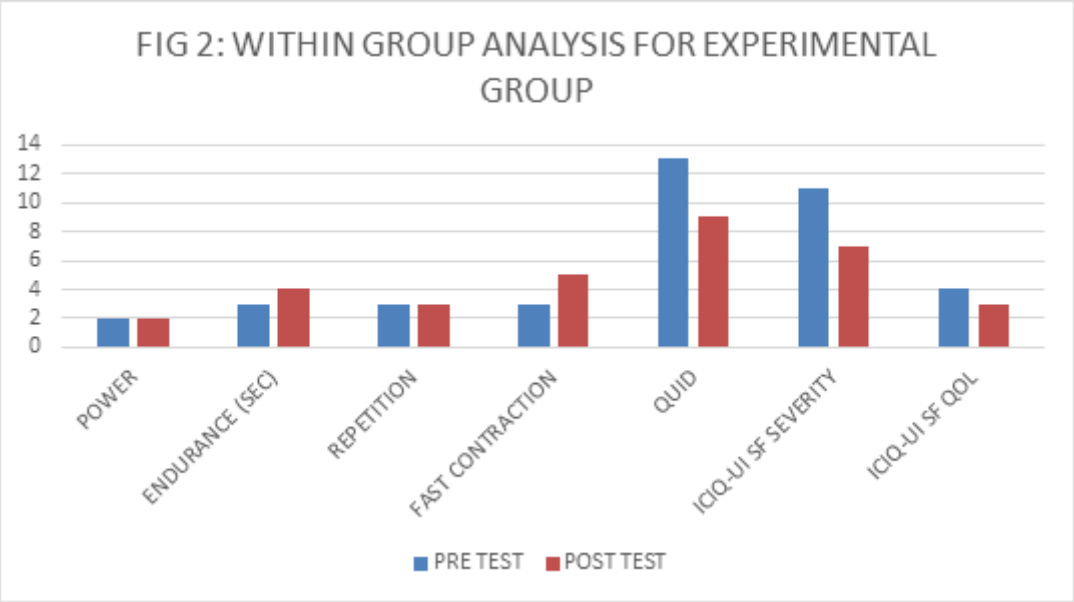
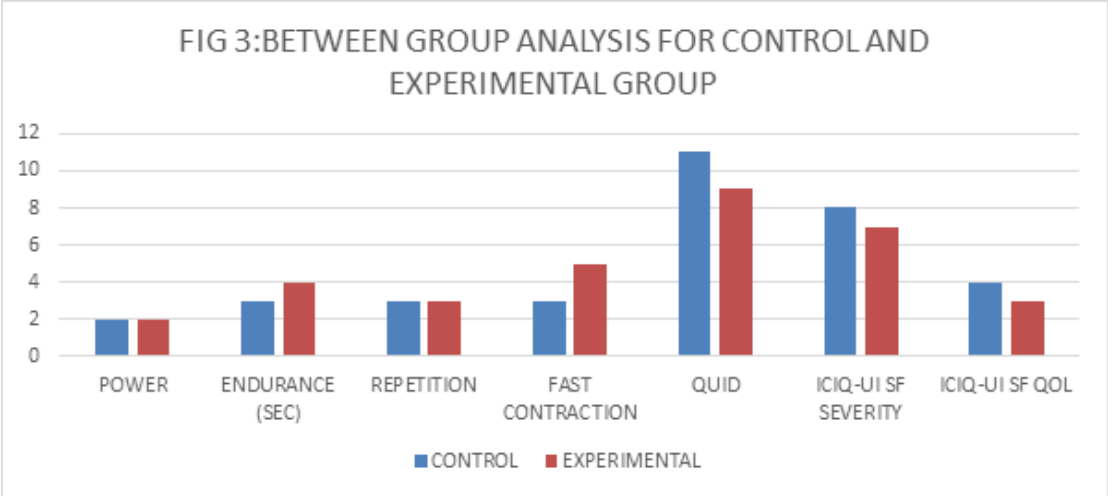


Table 4: Between Group Analysis

Between Group Variables	Median(Iqr) 1-Cg;2-Eg	P-Value
POST Power	1- 2(0.50)	0.966
	2- 2(0.00)	
Post Endurance	1- 3(1.50)	0.196
	2- 4(1.00)	
Post Repetition	1- 3(1.00)	0.428
	2- 3(1.00)	
Post Fast Contraction	1- 3(1.00)	0.009
	2- 5(2.00)	
Post Quid	1- 11(1.00)	<0.001
	2- 9(1.50)	
POST ICIQ-UI-SF Severity	1- 8(1.00)	0.003
	2- 7(1.50)	
Post Iciq-Ui-Sf Qol	1- 4(0.00)	0.003
	2- 3(0.50)	

Mann-Whitney U Test - (P<0.05)



DISCUSSION

The current study evaluated the impact of combining of BT with PFMT in middle aged women with SUI. The

results showed that both the control group and the experimental group shown improvement. Within-group analysis revealed significant improvements in urinary incontinence symptoms in both groups, as evidenced by reductions in symptom severity scores and improvement in quality-of-life measures.

These findings supported the effectiveness of PFMT as a primary intervention for stress urinary incontinence, as it enhanced PFM strength, endurance, and coordination, thereby improving urethral support during increases in intra-abdominal pressure [3,12]

Notably, the experimental group those who received the combination of both behavioural therapy and physical training had greater improvements than control group. Various evidence supports addition of behavioural therapy to improve the effectiveness of PFMT, similarly the experimental group showed significant improvements in fast contraction indicating enhanced neuromuscular control and quicker muscle response.

In addition, BT contributed to observable reduction in incontinence symptom severity (ICIQ-UI SF). Participants who received BT interventions showed improvement in adaptation to daily activities such as walking, sitting & standing, indicating reduction in incontinence symptoms such as urinary frequency, improved bladder control and improved quality of life. These findings are consistent with previous studies, which reported that behavioural therapy significantly improves in quality of life and reduces the symptom severity in women with stress urinary incontinence. [1, 11]

An RCT conducted by Apoorva *et al*. (2025), demonstrate significant improvement in pelvic floor muscle strength and reduction in urinary incontinence symptoms in group that received abdominal muscle strengthening along with PFMT.[2]

Behavioural strategies such as bladder retraining, scheduled voiding, and lifestyle modifications played an important role in improving urinary incontinence by helping to regulate voiding habits and reduce exposure to bladder irritants such as caffeine. [4]

Integrating BT and PFMT improves muscle strength and function, it also enhances symptom control and patient reported outcomes. Buyul et.al. (2021), concluded that combining PFMT with BT led to significant improvements in symptom reduction, physical activity levels and overall QoL.[5]

The Between group analysis deduced that although both groups showed improvements, the experimental group produced better outcomes in symptom reduction and functional improvement suggesting that BT might enhance awareness, increases consistency of exercise regimen and selfcare management than focusing on muscle strengthening alone [17].

PFMT primarily targets pelvic floor muscle dysfunction by improving strength and coordination, while behavioural therapy focuses on modifiable lifestyle factors that contribute to urinary incontinence. Sheng et al. (2022) reported that PFMT improves neuromuscular coordination and the timing of muscular contractions, which are essential for maintaining continence during sudden increases in intra-abdominal pressure.[10]

Behavioural interventions help to improve control by increasing bladder capacity, promoting healthy voiding pattern, and reducing urgency episodes. Wu et al. (2021) reported that combined behavioural and PFMT programs resulted in significant reduction in urinary urgency, frequency, and nocturia [8], supporting the findings of the present study.

Brubakar (2019) concluded that SUI in middle-aged women is often underreported and significantly impact daily activities and emotional health, supporting the need for targeted interventions, including behavioural therapy [19].

The Sussman et al. (2020) recommended that conservative management should include behavioural therapy along with PFMT and should be considered as a before surgical options. [21]. Similarly, Hu and Pierre (2019) highlighted the effectiveness of behavioural therapy interventions in improving bladder control and reducing urinary leakage, especially the women with mild and moderate symptom severity.[22.]

Exercise based rehabilitation has also been shown to improve pelvic floor muscle function. Fricke et al. (2021) found that structured exercise programs significantly enhance muscle performance and reduce urinary incontinence symptoms [7]. Dumoulin et.al (2026) demonstrated that PFMT is more effective in comparison to no treatment in improving continence outcome [6,12] reinforcing its role as a core intervention.

Current evidence supports the use of additional strategies along with PFMT. Alouini et.al (2022) concluded that combining PFMT with electrophysical agents such biofeedback or electrostimulation can improve continence outcomes [11,12] suggesting a combination of advanced PFMT approaches to enhance overall effectiveness of the pelvic floor rehabilitation.

Balambika and Sathyaprabha et.al (2022) demonstrated that a combination of abdominal muscle exercise along with PFMT improved symptoms of stress urinary incontinence supporting combined rehabilitation approach [18.]

Borello France et al. (2013) reported factors such motivation, awareness and access to the right guidance improves adherence to BT [17]. In this study, the structured and supervised environment played an important role in improving the patient compliance leading to better outcomes.

Stress urinary incontinence is caused due to influence of various factors such as aging, hormonal shifts and weakened pelvic floor muscles [13,1] and therefore one size fits all approach does not reduce the symptoms and

therefore there is a need for comprehensive approach tackles both physical and behavioural aspects.

Both the groups showed improvements in the present study, the greater outcome of the combined intervention highlights the effectiveness of multidimensional approach as BT enhances the treatment outcomes via patient engagement, adherence and lifestyle modification.

Overall, the findings of the present study suggested that PFMT remained a effective intervention for stress urinary incontinence, the addition of BT has enhanced the treatment outcomes by improving bladder control, adherence to the PFM rehabilitation and healthy lifestyle habit leading to a better physical health and improved QoL for middle ag

The limitation of the present study was the relatively small sample size. The duration of the intervention was also short, which may have limited the extent of observable changes.

FUTURE DIRECTIONS

Future studies should focus on conducting larger randomized controlled trials to improve the generalizability of the findings. Longer follow-up periods are recommended to evaluate the sustainability of treatment outcomes over time. In addition, the use of advanced techniques such as biofeedback and digital interventions may enhance treatment effectiveness and patient adherence.

CONCLUSION

Both the PFMT and the PFMT with BT were effective in improving urinary incontinence symptoms. PFMT and BT group had shown significant improvements in PFM function(fast contractions and endurance), QUID and ICIQ-UI-SF (severity, and quality of life) scores.PFMT along behavioral therapy enhances the pelvic floor muscle function , leading to better symptom control and improved quality of life in middle aged women with stress urinary incontinence.

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