Original Article

Pelvic Floor Muscle Exercise plus Core Stability Exercise on Urinary Incontinence in Females

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Abstract

Objective: To assess whether the combination of core stability exercises and pelvic floor muscle exercises offers greater benefits compared to pelvic floor muscle exercises alone in managing urinary incontinence among women with low back pain.

Methodology: This randomized controlled trial was conducted at the department of Urology Liaquat University of Medical and Health Sciences Jamshoro, Hyderabad from June 2023 to December 2023. Patients was dived into two groups. Group A receiving PFME combined with CSE, and a group B receiving only standard care for LBP. Core stability was evaluated through functional tests such as the plank endurance test and the side-bridge test. Quality of life was measured by the Incontinence Quality of Life Questionnaire (I-QOL).

Results: After the intervention, the mean pad weight reduced significantly from baseline to 12th week, as 9.76±2.01 g to 1.81±0.51 g, respectively, in Group A, ($p<0.001$). Baseline to 12th week, in Group B the mean pad weight was 9.98±2.06 g to 6.21±2.09 g, respectively ($p<0.001$). The cured patient's percentage was higher in Group A than Group B, 40 (80.0%) and 20 (40.0%), respectively. Severity index of incontinence was significantly reduced from baseline to 12th week of Group A, 5.25±2.79 to 0.88±0.26, ($p<0.001$), then in Group B as 5.36±2.52 to 2.50±1.82, ($p<0.001$).

Conclusion: Study findings concluded that pelvic floor muscle exercises combined with core muscle exercises are helpful in relieving low back pain in women with urinary incontinence, aiming to reduce urinary incontinence episodes and improve quality of life.

Keywords: Pelvic Floor Muscle Exercise, Urinary Incontinence, Core Stability Exercise, Back pain.

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Introduction

Urinary incontinence (UI), a condition characterized by the involuntary loss of urine, is more prevalent and challenging in present era.[1] According to the International Continence Society (ICS), there is a significant clinical association between LBP and UI, with the two conditions frequently occurring simultaneously. Individuals suffering from LBP are at greater risk of UL development.[2]

Nonspecific LBP is a common condition often found associated with trunk muscle dysfunction. Effective trunk control relies on the combined activity of the muscles within the abdominopelvic cavity. When these muscles, including the multifidus, transverse abdominis, rectus abdominis and pelvic floor muscles are dysfunctional, it can lead to disability, instability of spine and pain.[3,4]

The pelvic floor muscle (PFM) serves as the foundation for core muscles, making them interdependent.[5] Consequently, CLBP is frequently associated with core muscle weakness, which can lead to dysfunction of pelvic floor and UI.[6] Core stability exercises are frequently recommended for effectively managing LBP, with a focus on stabilizing core muscles, including the pelvic floor muscles, which play a significant role in

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supporting the body's core by engaging deep abdominal and back muscles.[7]

PFME has been extensively studied and proven to be highly effective, often recommended as a first-line treatment for Stress Urinary Incontinence (SUI).[8] During PFME, the pelvic floor muscles contract in forward and cranial direction, particularly activated during physical exertion and high-velocity movements such as coughing, sneezing, or laughing.[9] This contraction mechanism serves to prevent urine leakage by providing support to the pelvic organs and maintaining continence.[10]

The rationale for the study stems from the need to address the co-occurrence of stress urinary incontinence and nonspecific chronic low back pain in women through a comprehensive and synergistic treatment approach. By investigating the effects of PFM exercise combined with core stability exercise, the study aims to contribute valuable insights into improving the management and outcomes of these common and debilitating conditions.

Methodology

This prospective study was conducted at Tertiary care This RCT conducted at the department of Urology Liaquat University of Medical and Health Sciences Jamshoro, Hyderabad, Pakistan from June 2023 to December 2023. Random sampling technique was adopted. Ethical approval was obtained from the institutional review board. All participants were providing written informed consent prior to participation. Confidentiality of participant data was maintained throughout the study.

Patients were bifurcated an intervention group receiving PFME combined with CSE, and a control group receiving only standard care for NSCLBP. Women aged 18-65 years, diagnosed with SUI, completed treatment for NSCLBP, no prior pelvic floor or core stability exercise training and able to provide informed consent were included. Pregnant or postpartum women within the last 6 months, history of pelvic surgery or severe pelvic trauma, neurological conditions affecting bladder function and severe orthopedic conditions limiting exercise participation were excluded.

Participants were performing a series of core stability exercises designed to enhance abdominal and lower back muscle strength and coordination. Exercises were progressively challenging, including planks, bridges, and abdominal hollowing. Both exercise components were supervised by a trained physical therapist and were occur three times per week for 12 weeks. Each session was last approximately 60 minutes, with equal time devoted to PFME and CSE.

Primary and secondary outcomes were assessed at baseline (T0), immediate-intervention (4 weeks, T1), mid-intervention (8 weeks, T2), and at a 12-weeks follow-up (T3). One hour pad test was used for measurement of UI. Pelvic floor muscle strength was measured using a perineometer. Core stability was evaluated through functional tests such as the plank endurance test and the side-bridge test. VAS scale was used for measurement of LBP. Quality of life was measured by the Incontinence Quality of Life Questionnaire (I-QOL).

SPSS software was used for statistical analysis. Descriptive statistics were summarize demographic and baseline characteristics. Repeated measures ANOVA were used to compare changes in primary and secondary outcomes over time between the two groups. Intention-to-treat analysis was performed to account for any dropouts or non-compliance.

Results

The mean age of Group A and Group B was 48.54±8.18 years and 45.60±7.85 years, respectively. The mean BMI of Group A and Group B was 28.22±4.12 kg/m^2 and 26.81±4.46 kg/m^2, respectively. Further, the baseline profile of both the study group was almost equal (p>0.050). (Table I).

Table I: Demographics and baseline profile between the study groups.

Variable	Group A (PFME+CSE) N=50	Group B (PFME) N=50	P value
	Mean±SD		
Age (years)	48.54±8.18	45.60±7.85	0.070
BMI (kg/m^2)	28.22±4.12	26.81±4.46	0.102
Exercise level	1.73±0.52	1.80±0.64	0.609
Baseline pad test (g)	9.76±2.01	9.98±2.06	0.602
VAS score (10 mm)	3.88±1.92	3.63±2.07	0.538
ISI frequency	2.52±0.88	2.72±0.87	0.265
ISI amount	2.09±0.34	2.17±0.48	0.302
QoL (GH)	37.19±7.67	40.19±7.62	0.052
QoL (II)	47.23±10.19	45.67±11.49	0.475
QoL (RL)	27.64±4.95	25.58±6.01	0.064
QoL (PhyL)	35.39±10.38	33.16±12.05	0.333
QoL (SL)	12.36±2.03	12.21±1.93	0.715
QoL (PR)	28.87±7.34	24.47±5.85	0.762
QoL (EM)	32.08±8.62	31.63±8.24	0.791
QoL (SE)	6.22±1.29	6.27±1.02	0.846

After the intervention, the mean pad weight reduced significantly from baseline to 4th week, 8th week, and 12th week, as 9.76±2.01g to 7.43±1.26 g, 4.07±1.29 g, and 1.81±0.51 g, respectively, in Group A, (p<0.001). Whereas from baseline to 4th week, 8th week, and 12th week, in Group B the mean pad weight was 9.98±2.06g to 8.64±4.34g, 7.77±1.72g, and 6.21±2.09g, respectively. (p<0.001). The cured patient's percentage was higher in Group A than Group B, 40 (80.0%) and 20 (40.0%) respectively. (Table II)

Severity index of incontinence was significantly reduced from baseline to 12th week of Group A, 5.25±2.79 to 0.88±0.26, (p<0.001), then in Group B as 5.36±2.52 to 2.50±1.82, (p<0.001). (Table. III)

Table II: Comparison of pad weight at each week of intervention between the study groups.

Pad test	Group A	Group B	P value
	Mean±SD		
At Baseline (g)	9.76±2.01	9.98±2.06	0.602
At 4th week	7.43±1.26	8.64±4.34	0.059
Paired t test p-value	<0.001	0.083	
At 8th week	4.07±1.29	7.77±1.72	<0.001
Paired t test p-value	<0.001	<0.001	
At 12th week	1.81±0.51	6.21±2.09	<0.001
Paired t test p-value	<0.001	<0.001	
Cured n (%)	40 (80.0)	20 (40.0)	<0.001

Table III: Comparison of severity index of incontinence between the study groups.

UI frequency	Group A	Group B	P value
Severity index of incontinence at 12th week of intervention			
At baseline	5.25±2.79	5.36±2.52	0.838
At 12th week of intervention	0.88±0.26	2.50±1.82	<0.001
Paired t test p-value	<0.001	<0.001	

Discussion

Core stability exercises, often combined with pelvic floor muscle exercises, are recommended for managing NSCLBP by targeting stabilization of core muscles. This intervention strengthens muscles around the spine and pelvis, improving support and alignment to alleviate pain and enhance function over time, commonly used for Chronic Low Back Pain (CLBP).[11]

In current study mean age of patients in Group A and Group B was 48.54±8.18 years and 45.60±7.85 years, respectively. In a study conducted by Nipa et al[12]reported mean age of patients in PFME and core stability group as 41.00±9.07 and in group PFME mean age of patients was 40.84±8.82 years.

In this study after the intervention, the mean pad weight reduced significantly from baseline to 12th week, as 9.76±2.01 g to 1.81±0.51 g, respectively, in Group A, (p<0.001). A previous study conducted by Kamel et al[13] reported findings that align with the current research, indicating that PFM exercises with core muscle at 12 weeks are more effective than pelvic floor muscle strength training in treating mild stress urinary incontinence (SUI) among obese patients.

In this study severity index of incontinence was significantly reduced from baseline to 12th week of Group A, 5.25±2.79 to 0.88±0.26, (p<0.001), then in Group B as 5.36±2.52 to 2.50±1.82, (p<0.001). Additionally, previous studies conducted by Ghaderi et al[14] and Roza et al[15] found that the combined feature of pelvic floor muscles made cavity of lower abdomen. So, coordination activity of the lower abdominal muscles combined with PFMs helps to maintain urinary incontinence (UI).

The findings are consistent study conducted by Hagins et al[16], which demonstrated a significant reduction in urine leakage in stabilization exercises ($p < 0.05$). Conversely, Dumoulin et al[17] and Felicíssimo et al[18] conducted studies that corroborated the results of the control group, suggesting that Pelvic Floor Muscle Exercises (PFME) yielded comparable efficacy regardless of supervision or setting. Their findings indicated that both supervised and unsupervised PFME, as well as individual or group training sessions, demonstrated similar effectiveness when compared to receiving no treatment at all.

At 12th week follow up significant difference was observed between groups regarding quality of life, social limitations, severity measures and emotional measures when quality life was measured.[19] The clinical findings from a previous study conducted by Bo et al indicate that the lower abdominal cavity, shaped by the pelvic floor muscles (PFM), and the synchronized activity of lower abdominal muscles working in tandem with the PFM, play a significant role in maintaining urinary incontinence (UI).[20]

Conclusion

This study concluded that combining pelvic floor muscle exercises with a low-load core stability program may help relieve low back pain in women with stress

urinary incontinence, aiming to reduce urinary incontinence episodes and improve quality of life.

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