

Pelvic Floor Muscles Eccentric Training for Females with Urinary Incontinence- An Experimental Study

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ABSTRACT:

Aim: This study aims to evaluate the effectiveness of eccentric PFM training as a therapeutic intervention for UI in females. The primary focus is on assessing changes in UI frequency, functional activity, pelvic floor strength and quality of life measures pre- and post-intervention.

Background and purpose: The prevalence rate of urinary incontinence in the Indian population is higher and an important health problem faced by women which creates depression, anxiety and social isolation. The purpose of the study was put forward on this basis to improve the pelvic floor muscle strength through maximum force production by training the muscle in lengthened position. Eccentric training, emphasizing controlled lengthening contractions of PFMs, offers a novel approach to potentially enhance outcomes beyond conventional concentric exercises.

Methodology: It was an experimental study with stratified sampling of 30 females grouping into two groups of experimental and control group with inclusion criteria of females age of 25-50, with multiple vaginal delivery, and muscle strength as grade 2 and above in modified oxford scale and excluded females with other comorbidities and risk factors. The study was conducted for 16 weeks with 3 days a week, 3 sets a day and 10 repetitions per set. The control group received patient education and lifestyle modification whereas the experimental group received eccentric training of pelvic floor muscle. The frequency of the urinary incontinence was assessed using Urinary Incontinence Impact Questionnaire-7 and muscle strength was assessed using The Modified oxford grading system for PFM.

Results: The data were collected, calculated and results were obtained using the outcome measure tools. There was an improvement in the pelvic floor muscle strength as well as their wellbeing.

Conclusion: Eccentric training of pelvic floor muscles shows promise in improving symptoms of urinary incontinence in females, suggesting its potential as an effective therapeutic intervention.

Keywords: Pelvic floor muscles; Eccentric training; females; urinary incontinence; modified oxford scale; urinary incontinence impact questionnaire 7

INTRODUCTION:

Urinary incontinence (UI) remains a prevalent and distressing condition affecting millions of women worldwide, significantly impacting their quality of life and psychological well-being. Defined as the involuntary leakage of urine, UI manifests in various forms including stress, urge, and mixed incontinence, each presenting unique challenges in management and treatment. Among the diverse treatment modalities, pelvic floor muscle (PFM) exercises have long been recognized as a cornerstone in the non-surgical

management of UI. These exercises, typically involving contraction and relaxation of the PFMs, aim to improve muscle tone, support pelvic organs, and enhance urinary continence. However, traditional concentric muscle training, which focuses on muscle contraction against resistance, may not fully address the dynamic requirements of pelvic floor function during daily activities. In contrast, eccentric training represents a novel approach that emphasizes controlled lengthening contractions of the PFMs. This method is hypothesized to enhance muscle strength and endurance more effectively than concentric exercises alone, as it targets both eccentric and concentric muscle actions. Eccentric training is particularly promising for conditions like UI. Despite its potential benefits, empirical evidence on the effectiveness of eccentric PFM training specifically for UI remains limited and heterogeneous. Therefore, this study aims to systematically evaluate the effectiveness of eccentric training of pelvic floor muscles as a therapeutic intervention for females experiencing urinary incontinence. By synthesizing current literature, analysing clinical trials, and examining methodological considerations, this research seeks to provide critical insights that could optimize treatment strategies and improve outcomes for women managing this prevalent and burdensome condition.

OBJECTIVES:

The objective of this particular study is to find whether the eccentric training of pelvic floor muscles was helpful in females with urinary incontinence to reduce the urinary incontinence and improve the functional activity. The scales like modified oxford grading system were used to find the pelvic floor strength pre and post-test. Urinary Incontinence Impact Questionnaire-7 was used to find the quality-of-life pre and post-test.

METHODOLOGY:

The study was an experimental study with 30 females as participants with 16-week protocol. The control group (15) was given conventional physiotherapy. The experimental group (15) received eccentric training of pelvic floor muscles.

Inclusion criteria: Females with age varying from 25- 50 years, multiple vaginal deliveries, modified oxford grade 2 and above.

Exclusion criteria: Pregnant women, presenting with tumour, C section delivery, Lumbar pathologies, Disc prolapse, Urinary tract infection, Osteoporosis, Diabetic mellitus and insipidus, Fractures, other neurological issues, cognitive disability, psychiatric patients and non-cooperative patients.

OUTCOME MEASURES:

Manual muscle testing – Modified Oxford grading for pelvic floor muscles

Urinary Incontinence impact questionnaire 7

PROCEDURE:

The experimental group received eccentric training along with breathing techniques and postural awareness. These were performed under supervision. Initially it was done in 3 days per week, later on increased with reps and sets for endurance control. The protocol is detailed in the Table.1

S.No.	WEEK (1-4) MILD STRENGTHENING WITH BREATHING EXERCISES IN ALL EXERCISES.	FREQUENCY
1.	Eccentric Kegel's exercise	5 secs hold/ 10 reps; (release slowly)

2.	Ball squeeze exercise in between thighs	3 sets / 10 reps
3.	Wall squat with wide base	3 sets/ 10 reps
4.	Pelvic bridging focus on maintaining	3 sets/ 10 reps
WEEK (5-8) MODERATE STRENGTHENING EXERCISE		
5.	Quadruped position with pelvic rocking	3 sets/ 10 reps
6.	Leg raising in supine with focus on lowering	3 sets/10 reps
7.	Squatting with focus in eccentric phase	3 sets/10 reps
8.	Kneel sitting to kneeling	3 sets/10 reps
WEEK (9-12) ADVANCED CONDITIONING WITH THERA BANDS		
9.	Wall squats using TheraBand focus on lowering phase	4 sets/12 reps
10.	Lunges with focus on lowering down	4 sets/12 reps
11.	Kneel sitting to kneel using Swiss ball	4 sets/12 reps
12.	Quadruped with arm and leg raise to lower along with pelvic rocking back	4 sets/12 reps
WEEK (12-16) ENDURANCE CONTROL		
13.	Wall squats using TheraBand	4 sets/15 sets
14.	Lunges with TheraBand	4 sets/ 15 sets
15.	Quadruped with alternate arm and leg raise with backward pelvic rock	4 sets/15 sets
16.	Kneeling to kneel sitting with Swiss ball	4 sets/15 sets

(Table.1)

Continuous and constant breathing exercises were taught to patients in order to avoid strain on pelvic floor muscles during the exercise protocol. Constant deep breathing followed by controlled expiration was followed during lengthening phase of the muscle which increases the efficacy of the eccentric contraction of the muscle. Warm up exercises and stretching exercises were done before starting the exercises and cool down exercises like relaxation techniques were taught to patients to end the session. Adequate rest periods were given to avoid strains.

RESULTS:

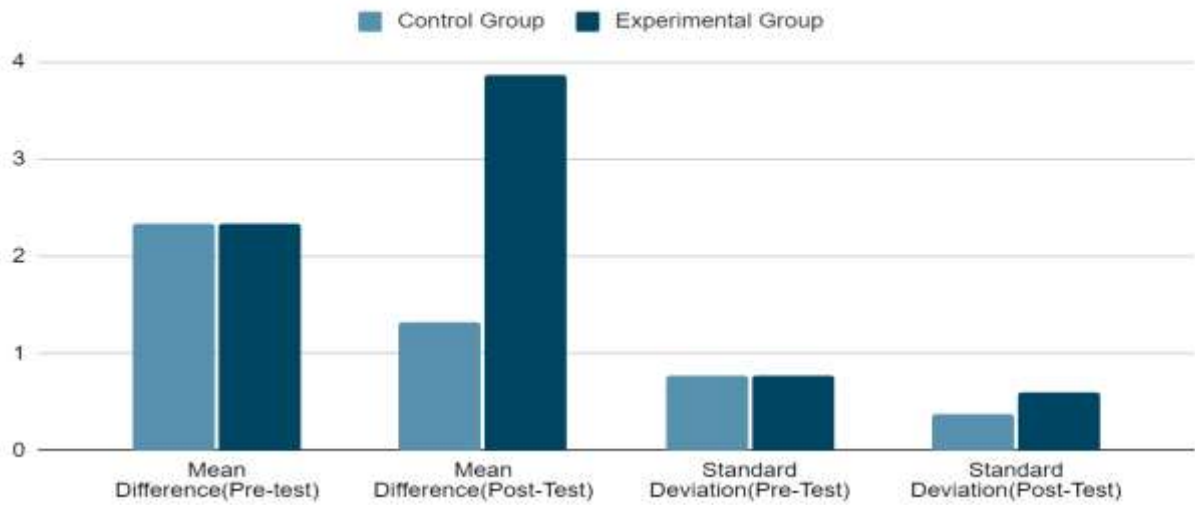
The mean difference was obtained for both the control group and experimental group with a mean difference and standard deviation and are given in table.2 and table.3.

Oxford Muscle Grading:

Group	Mean Difference (Pre-Test)	Mean Difference (Post-Test)	Standard Deviation(Pre-Test)	Standard Deviation(Post-Test)
Control group	2.33	1.33	0.77	0.37
Experimental group	2.33	3.86	0.77	0.60

(Table.2)

Modified Oxford Scale for Pelvic floor Muscles



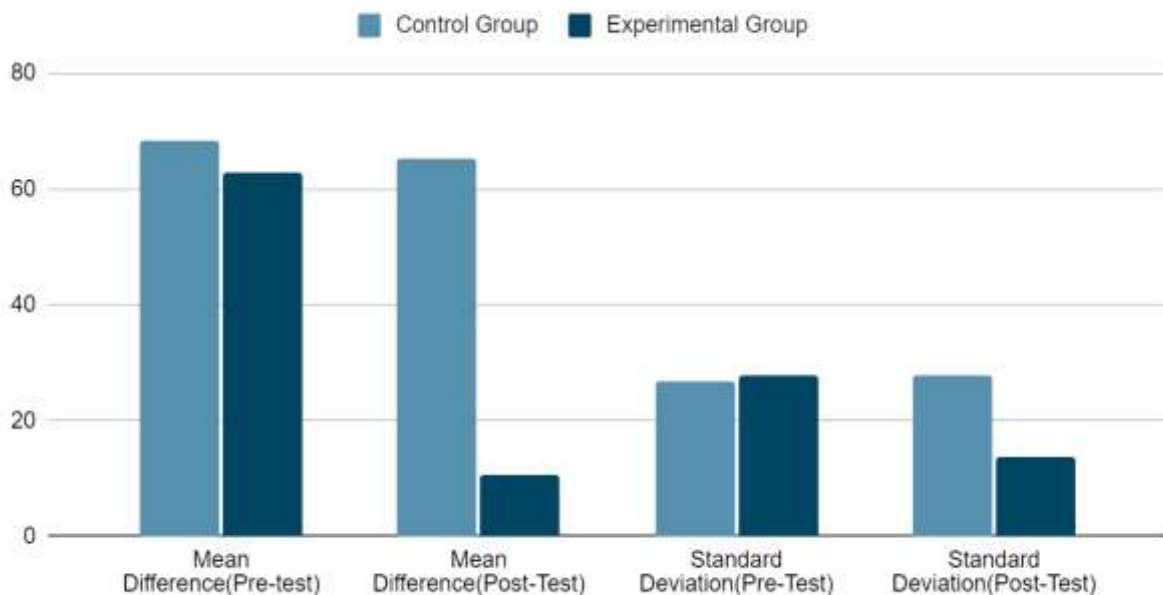
(Figure.1)

UIQ- Urinary Incontinence Impact Questionnaire-7:

Group	Mean Difference (Pre-Test)	Mean Difference (Post-Test)	Standard Deviation (Pre-Test)	Standard Deviation (Post-Test)
Control group	68.20 %	65.41 %	26.81	27.72
Experimental group	62.95%	10.58 %	27.94	13.81

(Table.3)

Urinary Incontinence Impact Questionnaire-7



(Figure.2)

CONCLUSION:

The 16-week study protocol with the eccentric training of the pelvic floor muscle showed a greater result in improvement of the pelvic floor muscle strength and the functional activity among the subjects. This training is most cost effective and can be used in clinical setup to show maximum improvement in the females with urinary incontinence.

DISCUSSION:

Building upon the promising results of a 16-week protocol utilizing eccentric pelvic floor training for 30 females with urinary incontinence, as assessed by the Oxford grading scale and Urinary Incontinence Impact Questionnaire-7, several avenues for further research emerge. Longitudinal studies are essential to evaluate the sustainability of improvements over time, extending follow-up assessments to determine the long-term effectiveness of eccentric training. Comparing its efficacy with traditional pelvic floor exercises, biofeedback, and surgical interventions would offer insights into optimal treatment choices based on outcomes and patient satisfaction. Diversifying participant demographics to include varying age groups, severity levels, and comorbidities would provide a clearer understanding of eccentric training's universal applicability. Mechanistic studies, including electromyography and imaging techniques, could elucidate the physiological changes underlying its effectiveness in improving pelvic floor muscle function and continence.

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