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Effect of the Eight Weeks of Core Stability Exercises on Urinary Incontinence and Quality of Life in Women with Urinary Stress Incontinence: A Quasi-Experimental Study

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Original Article

Abstract

Introduction: Urinary incontinence is a debilitating and infuriating disorder that appears with involuntary excretion of urine, resulting in psychological, health-related and social complications. The aim of this study was to investigate the effect of eight weeks of core stability training on urinary incontinence and quality of life in women's with urinary incontinence.

Materials and Methods: In this quasi-experimental study, 24 women with urinary incontinence were recruited and included through convenient sampling and randomly assigned into two equal-size groups marked as the experimental and the control. ICIQ-UISF questionnaire and SF-36 questionnaire, were used to assess urinary incontinence and quality of life (QoL). The experimental group participated in core stabilization exercises 45 minute a session, three sessions per week for eight weeks; the control group did not participate in any type of training in the same period. Data was analyzed by repeated measures analysis of variance at the significance level of 0.05.

Results: Following eight weeks of core stability training, significant improvement in urinary incontinence ($F = 93.7$, $P = 0.001$) and quality of life scores ($F = 28.1$, $P = 0.001$), was evident in the experimental group compared to the control group.

Conclusion: Core stabilization exercises seem to be an effective approach in urinary incontinence management in women. Thus, they are recommended to be included in management of women with urinary incontinency.

Keywords: Physical exercises; Urinary incontinence; Quality of life

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Introduction

Urinary incontinence is a distressing condition characterized by involuntary urine leakage (1). Coughing, sneezing, straining, jumping, and running are among the activities that may trigger involuntary urine leakage in individuals with urinary incontinence (2). Regardless of its severity, urinary incontinence is a major medical and social concern among women, affecting 55% of the female population (3).

Urinary incontinence affects multiple aspects of an individual's life, including social, psychological, occupational, familial, physical, and sexual functioning. It limits the ability to enjoy daily activities, social interactions, travel, and personal relationships (4). Its consequences can be classified into three categories: psychological, physical, and social. Adverse psychological consequences include anxiety, worry, hopelessness, tension, stress, and reduced self-confidence and self-esteem (5, 6).

Until the late twentieth century, surgery was the primary treatment for women with urinary incontinence. Today, however, the International Continence Society (ICS) considers conservative approaches the first-line treatment for uncomplicated

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urinary incontinence (7). Among these approaches, pelvic floor muscle training plays a fundamental role in preventing stress urinary incontinence (SUI). Overall, pelvic floor muscle strengthening exercises appear to be the most commonly used therapeutic approach for managing SUI (8). For example, Kegel exercises have been recommended as an effective strategy for preventing certain types of urinary incontinence and improving quality of life in men undergoing radiotherapy for prostate cancer (9).

A review indicated that although pelvic floor exercises are an appropriate treatment for women with urinary incontinence, they are not the only exercise-based intervention available. The review therefore emphasized the need for further research to achieve sustained, long-term improvements (10). Another review reported that combining pelvic floor muscle training with other therapeutic interventions, such as physiotherapy, behavioral therapy, pharmacotherapy, and surgery, did not provide additional benefits over these interventions alone in women with urinary incontinence (11). By contrast, a separate review found that exercises such as deep abdominal muscle training, the Paula method, and Pilates could not replace pelvic floor muscle training for improving and managing SUI in affected women (12). Thus, identifying the optimal exercise-based approach to treating urinary incontinence remains a challenge.

The core muscles comprise a group of axial muscles that form a cylinder around part of the trunk. The abdominal muscles, particularly the transversus abdominis, form the anterior and lateral walls; the multifidus forms the posterior wall; the diaphragm forms the roof; and the pelvic floor muscles form the base of this cylinder (13). Core exercises improve strength, endurance, and neuromuscular control in this region. By regulating intra-abdominal pressure and controlling trunk movements, these exercises enhance the body's ability to maintain balance during various dynamic activities (14, 15).

In general, SUI can be attributed to impaired function and reduced stability of the structures supporting the pelvic floor, resulting in a diminished capacity to transfer mechanical loads effectively (16). It is the most common form of urinary incontinence. It is characterized by urine leakage following an increase in intra-abdominal pressure, such as that caused by coughing, laughing, or changing position (15). Given the higher prevalence of urinary incontinence among women and the importance of its treatment, management, and prevention, the present study aimed to investigate the effects of eight weeks of core stability training on urinary incontinence and quality of life in women with this condition.

Materials and Methods

Study Design and Participants: This quasi-experimental study employed a two-group pretest–posttest design involving an exercise intervention and a control group. The target population comprised women with urinary incontinence in Isfahan, Iran. Twenty-four eligible women attending Shahid Sadoughi Hospital in Yazd were recruited using convenience and purposive sampling and allocated by simple randomization, through drawing lots, to an experimental group (n = 12) or a control group (n = 12).

The inclusion criteria were urinary incontinence during the preceding six months, age between 30 and 60 years, no contraindications to exercise as determined by a urologist, and willingness to participate in the study. The exclusion criteria included voluntary withdrawal, irregular attendance at exercise sessions, unforeseen conditions such as surgery or musculoskeletal disorders, and conditions affecting other body systems that would prevent participation.

Ethical principles were observed throughout the study, and the study protocol was approved by the ethics committee of the affiliated institution. Before the study began, eligible participants were given the opportunity to read the informed consent form and sign it if they wished to participate.

Intervention and Outcome Measures

Assessments were conducted before and after the intervention in both groups. Participants in the experimental group received a comprehensive explanation of the exercise protocol and completed an eight-week intervention consisting of three 45-minute sessions per week, for a total of 24 sessions.

Urinary incontinence was assessed using the Persian version of the International Consultation on Incontinence Questionnaire–Urinary Incontinence Short Form (ICIQ-UI SF) (17). This questionnaire comprised six questions assessing the amount, frequency, and timing of urine leakage, as well as its impact on the patient's life.

Quality of life was assessed using the Persian version of the 36-Item Short Form Health Survey (SF-36). This instrument consists of 36 items assessing two components—physical and mental health—across eight domains: physical functioning, role limitations due to physical health problems, bodily pain, role limitations due to emotional problems, mental health, vitality, social functioning, and general health (18). Each subscale comprises 2–10 items. During the corresponding period, participants in the control group did not participate in any specific exercise or training program.

Core Stability Exercise Program

The exercise program was adapted from a book on core strengthening (19). The protocol was tailored to the participants' abilities and administered by the researcher. Before the main study, a two-week pilot intervention was conducted with two individuals whose characteristics were similar to those of the study participants to assess the feasibility and safety of the exercises. These individuals were excluded from the main study to eliminate potential learning effects and their influence on exercise performance.

Each exercise session lasted 45 minutes and comprised a 10-minute warm-up, 25 minutes of core exercises, and a 10-minute cool-down. The exercise program is presented in Table 1.

Statistical Analysis: Descriptive statistics, including means and standard deviations, were used to summarize the data. After normality had been confirmed using the Shapiro–Wilk test, baseline demographic characteristics were compared using independent-samples t-tests to assess group comparability. No between-group differences were identified at baseline. Repeated-measures analysis of variance (ANOVA) was used for inferential analysis and hypothesis testing. Data were analyzed using SPSS version 21 (IBM Corporation, Armonk, NY, USA). The threshold for statistical significance was reported as $p < 0.05$.

Results

During the study, three participants in the experimental group were excluded because of irregular attendance at exercise sessions, and three participants in the control group withdrew for personal reasons. The participants' demographic characteristics, including age, height, weight, and body mass index, are presented in Table 2.

The demographic characteristics of the experimental and control groups were compared using independent-samples t-tests. No statistically significant between-group differences were observed for any of the measured variables ($p > 0.05$). Thus, the two groups were considered comparable in terms of their demographic characteristics. The overall results of the repeated-measures analysis of variance are presented in Table 3.

Overall, the findings demonstrated that the core stability exercise program significantly reduced urinary incontinence and improved participants' quality of life ($p \leq 0.050$).

Discussion

The present study investigated the effects of core stability training on urinary incontinence and quality of life in women with urinary incontinence. Following eight weeks of core stability training, substantial improvements were observed in urinary incontinence and quality-of-life scores. These findings were consistent with those of previous studies (9, 20–26).

Active, or dynamic, lumbopelvic stability is achieved through the action of the deep trunk muscles—the lumbar multifidus and transversus abdominis—together with the pelvic floor muscles and diaphragm (27).

Table 1. Core Stability Exercise Protocol

Week 1	Repetitions	Week 2	Repetitions	Week 3	Repetitions	Week 4	Repetitions
2 sets of 15 reps	Sit-ups	3 sets of 10 reps	Sit-ups	3 sets of 10 reps	Sit-ups	2 sets of 10 reps	Sit-ups
2 sets of 8 reps	Leg raises	2 sets of 8 seconds	Leg holds	3 sets of 10 reps	Reverse crunches	2 sets of 8 reps	Leg raises
2 sets of 10 seconds	Right-side plank	2 sets of 10 reps	Bridging	3 sets of 10 reps	Bridging	2 sets of 8 reps	Bridging
2 sets of 10 seconds	Left-side plank	2 sets of 15 reps	Reverse crunches	2 sets of 10 seconds	Plank	2 sets of 8 reps	Reverse crunches
2 sets of 10 reps	Reverse crunches	2 sets of 10 seconds	Plank	2 sets of 8 seconds	Leg raises		
Week 5	**Repetitions**	**Week 6**	**Repetitions**	**Week 7**	**Repetitions**	**Week 8**	**Repetitions**
2 sets of 25 reps	Sit-ups	3 sets of 20 reps	Sit-ups	2 sets of 20 reps	Sit-ups	3 sets of 15 reps	Sit-ups
3 sets of 10 reps	Leg raises	3 sets of 10 reps	Leg raises	3 sets of 10 reps	Leg raises	3 sets of 15 seconds	Leg holds
2 sets of 20 reps	Reverse crunches	2 sets of 20 reps	Bridging	3 sets of 10 reps	Leg holds	2 sets of 15 reps	Bridging
3 sets of 15 reps	Bridging	3 sets of 10 seconds	Right-side plank	3 sets of 15 reps	Reverse crunches	2 sets of 15 reps	Reverse crunches
2 sets of 20 seconds	Plank	3 sets of 10 seconds	Left-side plank	2 sets of 15 seconds	Plank		

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Table 2. Demographic Characteristics of the Participants

Variable	Group	Mean ± SD	Median	Min–Max	Skewness ± SE	Kurtosis ± SE	t	p
Age (years)	Experimental	48.45 ± 7.6	48	39–59	0.19 ± 0.63	−1.4 ± 1.2	0.85	0.34
	Control	49.50 ± 6.6	49.5	38–58	0.12 ± 0.63	0.72 ± 1.1		
Height (m)	Experimental	1.60 ± 0.41	1.60	1.54–1.67	−0.8 ± 0.63	−0.7 ± 1.2	0.78	0.45
	Control	1.58 ± 0.49†	1.58	1.51–1.66	−0.42 ± 0.63	−0.15 ± 1.2		
Weight (kg)	Experimental	63.2 ± 6.1	63.5	48.0–72.0	−1.1 ± 0.63	2.6 ± 1.2	0.95	0.18
Age (years)	Experimental	48.45 ± 7.6	48	39–59	0.19 ± 0.63	−1.4 ± 1.2	0.85	0.34

SD: Standard deviation; SE: Standard error

During pelvic floor muscle contraction, the trunk muscles, particularly the transversus abdominis, are activated, and their coordinated, simultaneous activity contributes to spinal stability. Pelvic floor and trunk muscle activity is interrelated, with contraction of one facilitating contraction of the other (28).

The transversus abdominis is the deepest abdominal muscle. Owing to its distinctive anatomical and biomechanical characteristics and attachments, it is considered one of the principal stabilizers of the lumbopelvic region. It acts as a primary spinal stabilizer through two mechanisms: increasing intra-abdominal pressure and increasing thoracolumbar pressure (13). Accordingly, the beneficial effects of core stability training on urinary incontinence may be attributable to the functional interrelationship between the pelvic diaphragm muscles and the transversus abdominis.

Improvements in quality of life could be anticipated as patients gained better control over urine retention and voiding. Beyond its implications for hygiene, urinary incontinence can have serious personal, social, psychological, and familial consequences by causing embarrassment and intensifying feelings of incapacity. As individuals regain control over urine leakage, they may gradually become less socially withdrawn and participate more actively in family and social activities.

Limitations

A perineometer is one of the most useful instruments for assessing pelvic floor muscle strength. However, it could not be used in the present study because participants were unwilling to cooperate with this assessment. Furthermore, an intention-to-treat (ITT) analysis was not performed. Given the quasi-experimental design of this study, further high-quality research using randomized controlled trials is warranted to improve the generalizability of the findings

Recommendations

Future research should investigate the effects of core stability training in women who continue to experience urinary incontinence despite surgical treatment. Studies with appropriate follow-up periods are also recommended to evaluate and compare the effects of the exercise program used in the present study in individuals with other types of urinary incontinence, those with fecal incontinence, and men with various forms of incontinence.

Conclusion

The findings of the present study indicated that core stability training, as a targeted therapeutic approach, can substantially improve urinary incontinence and quality of life in women with urinary incontinence.

Table 3. Results of the Repeated-Measures Analysis of Variance for the Study Outcomes

Outcome	Group	Pretest (Mean ± SD)	Posttest (Mean ± SD)	Within-Group Effect	Between-Group Effect	Group × Time Interaction
Urinary incontinence score	Experimental	14.5 ± 2.1	10.3 ± 2.3	F = 74.1; p ≤ 0.001	F = 7.05; p = 0.01	F = 93.78; p ≤ 0.001*
	Control	14.8 ± 2.4	15.08 ± 2.4			
Quality of life: physical component	Experimental	164.5 ± 24.8	206.9 ± 24.3	F = 12.8; p = 0.002	F = 0.9; p = 0.3	F = 21.6; p ≤ 0.001*
	Control	185.3 ± 24.5	179.9 ± 21.1			
Quality of life: mental component	Experimental	155.1 ± 24.8	208.1 ± 55.8	F = 7.7; p = 0.01	F = 1.1; p = 0.1	F = 27.1; p ≤ 0.001*
	Control	157.1 ± 36.1	141.1 ± 23.8			
Overall quality of life	Experimental	319.6 ± 33.2	414.9 ± 25.6	F = 18.1; p = 0.001	F = 2.9; p = 0.09	F = 28.1; p ≤ 0.001*
	Control	342.4 ± 38.8	321.0 ± 26.2			

SD: Standard deviation
*Statistically significant at the 0.05 level.

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Authors' Contribution

Study conception and design: Bahareh Mahjourian and Gholamali Ghasemi.
Administrative, operational, and scientific support: Bahareh Mahjourian and Gholamali Ghasemi.
Provision of equipment and recruitment of study participants: Bahareh Mahjourian and Gholamali Ghasemi.
Data collection: Bahareh Mahjourian and Gholamali Ghasemi.
Analysis and interpretation of results: Bahareh Mahjourian and Gholamali Ghasemi.
Statistical expertise: Gholamali Ghasemi.
Critical revision of the manuscript for scientific content: Bahareh Mahjourian and Gholamali Ghasemi.
Final approval of the manuscript for submission: Bahareh Mahjourian and Gholamali Ghasemi.
Manuscript preparation: Bahareh Mahjourian and Gholamali Ghasemi.
Responsibility for the integrity of the study from inception to publication and for responding to reviewers' comments: Bahareh Mahjourian and Gholamali Ghasemi.

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Conflict of Interest

The authors did not have a conflict of interest.

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