



Efficacy of pelvic floor and core stabilization exercises on urinary incontinence in the postpartum period

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Abstract

Aim: Pelvic floor exercises and core stabilization exercises are effective for urinary incontinence. This study aims to compare the effectiveness of pelvic floor exercises and core stabilization exercises in the treatment of urinary incontinence in women.

Materials and Methods: This study was a randomized controlled trial. Forty women 1 to 6 months postpartum were recruited. The postpartum women were randomly divided into three groups: 1) pelvic floor exercises group (PFE); 2) core stabilization group (CS), and 3) control group (C). Pelvic floor muscle exercises were performed 3 times a day (morning, noon, and evening) in 3 different positions (lying on your back, sitting and standing) in the PFE group. Participants performed core stabilization exercises three days a week for 6 weeks in the CS group. Participants did not receive any exercise therapy and continued their routine. Urogenital Distress Inventory (UDI-6), Incontinence Impact Questionnaire (IIQ7) and Incontinence Severity Index (ISI) were used as outcome measurements.

Results: A statistically significant difference was observed in all outcome measures in the PFE and CS group ($p < 0.05$). Also, there was no statistically significant change in outcomes measures in the control group ($p > 0.05$). There was no significant difference between the outcome measures of the PFE and CS groups except for ISI values ($p > 0.17$). UDI-6 and IIQ7 results in the PFE group improved more than in the CS group. When the PFE and control groups were compared, the PFE group was found to be more effective than the control group in terms of all results ($p < 0.017$).

Conclusion: Pelvic floor exercises and core stabilization exercises are effective methods for reducing incontinence symptoms in the postpartum period. Pelvic floor muscle training caused more significant changes than core stabilization exercises in postpartum women.



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Introduction

Urinary incontinence (UI) in women is a common problem that significantly impacts their quality of life. UI refers to the condition of urine leakage or loss of control, which restricts individuals' daily activities [1]. The fundamental issue underlying urinary incontinence in women is the weakening or dysfunction of the pelvic floor muscles. This condition leads to the weakening of sphincter control and urine leakage due to inadequate pelvic floor muscle strength. Pelvic floor exercises are considered an effective method for treating this problem [2].

It is noted that childbirth plays a major role in the onset of pelvic floor dysfunction. Changes occur in the urinary

system due to the effects of hormones secreted during pregnancy, and these changes can lead to the development of urinary incontinence in the postpartum period. Due to its prevalence, cost, and impact on women's quality of life, pelvic floor dysfunctions are recognized as one of the most important problems affecting public health [3]. One of the significant factors causing pelvic floor dysfunction is childbirth. Studies in this regard suggest that childbirth can cause pelvic floor damage due to nerve, muscle, and connective tissue injury (such as compression, stretching, tearing) [4].

There is evidence supporting the effectiveness of certain exercise types in preventing postpartum urinary incontinence [5]. Among these, core stabilization exercises are defined as an ideal exercise for individuals of all ages and genders. The main goal of core stabilization exercises is to increase muscle volume and strength. It is believed that core stabilization exercises applied to the pelvic region can

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strengthen the muscle groups that provide urethral closure pressure and support pelvic organs (urethra, vagina, and rectum), thus preventing the development of conditions such as urinary incontinence and prolapse [6].

During pregnancy and the postpartum period, pelvic floor muscle exercises, also known as Kegel exercises, are the most effective way to prevent urinary incontinence. These exercises involve voluntary contraction of periurethral and perivaginal muscles, increasing urethral closure pressure and providing support to pelvic visceral structures. They are widely used and considered a technique that helps increase support for pelvic visceral structures [7]. This study aims to compare the effectiveness of pelvic floor exercises and core stabilization exercises in the treatment of urinary incontinence in women. Through this study, we aim to gain further insights into the effectiveness and advantages of pelvic floor exercises in the treatment of urinary incontinence in women. The results of this study may influence clinical practices and future research in the treatment of urinary incontinence.

Materials and Methods

This randomized controlled study was conducted with female participants who applied to Camlica Medipol Hospital Gynecology and Obstetrics Clinic between June 2022 and May 2023 and agreed to participate in the study.

The study was carried out with the permission of the ethics committee of Istanbul Medipol University, decision number 509, dated 10.06.2022, numbered E-10840098-772.02-3327. Individuals who agreed to participate in the study were informed about the purpose and importance of the study and the time they would spend for the interview, and their consent was obtained. This study was conducted by the principles of the Declaration of Helsinki.

Participants

Forty women 1 to 6 months postpartum who gave birth (normal delivery or cesarean section) at Istanbul Medipol University Camlica Hospital and met the inclusion criteria were recruited in the study. Inclusion criteria were determined as being between the ages of 18-49, having stage 0-1-2 stress urinary incontinence complaints, being 1-6 months postpartum, and not having any chronic health problems. People with incontinence conditions requiring a surgical approach and those with gynecological cancer were not included in the study.

Intervention protocol

The postpartum women were randomly divided into three groups: 1) pelvic floor exercises group (PFE); 2) core stabilization group (CS), 3) control group (C) with the random.org website. Participants were assigned numbers from one to forty in the order of their inclusion in the study. Individuals, numbered in the order of inclusion in the study, were divided into three groups with random distribution on randomizer.org.

Pelvic Floor Exercise (PFE) group: In the exercise group, pelvic floor muscle training were performed. Pelvic floor muscle exercises were performed 3 times a day (morning, noon, evening) in 3 different positions (lying on your back,

sitting and standing). They were advised to pull their muscles inwards 10 times, as if stopping the outflow of urine or gas, and keep them contracted for 5 seconds, and then give their muscles as much time to relax as the time they kept contracted, that is, to relax their muscles for 5 seconds. They were asked to increase the duration of contraction by 1 second each week, increasing it to 10 seconds in the 6th week and continuing at 10 seconds thereafter, and likewise increasing the relaxation time by 1 second each week, increasing it to 10 seconds in the 6th week and continuing at 10 seconds thereafter.

The patients were told that they should take a deep breath before starting the exercise, then continue breathing comfortably and smoothly until the exercise was completed, and not hold their breath while squeezing. An exercise brochure was given to the participants to better understand the explanations given.

Core stabilization (CS) group: Participants performed warm-up, cool-down and core stabilization exercises 3 days a week for 6 weeks in CS group. The exercise program consisted of diaphragmatic breathing exercises, core stabilization exercises for the transversus abdominis muscle such as reverse trunk twist, reverse crunch, hip abductor-adductor muscle strengthening, bird-dog exercises and cat camel exercises. It was recommended to perform diaphragmatic breathing exercises during each exercise and contractions were requested for at least 5 seconds during the exercise. The core stabilization exercise program was performed as a home exercise program. Exercise therapy adherence were controlled using telephone calls by the physiotherapists.

Control (C) group: Participants did not receive any exercise therapy and continued their routine.

Outcomes measurements

Urogenital Distress Inventory (UDI-6): UDI-6 is a short version of a condition-specific quality-of-life instrument, and was introduced in 1994. Presently, due to its feasibility, UDI-6 is much more often used than its longer version. UDI-6 consists of six items: 1- Frequent urination, 2-Leakage related to the feeling of urgency, 3- Leakage related to activity, 4- Coughing, or sneezing small amounts of leakage (drops), 5- Difficulty emptying the bladder, and 6- Pain or discomfort in the lower abdominal or genital area. The total score is from 0 to 100. Higher scores in UDI-6 indicate higher disability [8].

Incontinence Impact Questionnaire (IIQ7): IIQ-7 is a urinary incontinence-specific psychometric questionnaire. This questionnaire assesses the psychosocial impact of urinary incontinence in women. It consists of seven items: 1- Household chores, 2- Physical recreation, 3- Entertainment activities, 4- Travel >30 min away from home, 5- Social activities, 6- Emotional health (nervousness, depression, etc.), 7- Feeling frustrated; which is subdivided into four domains: physical activity (items 1 and 2), travel (items 3 and 4), social activities (item 5), and emotional health (items 6 and 7). The total score ranges from 0 to 100 [9].

Incontinence Severity Index (ISI): Sandvik et al., which was developed by applied to women suffering from urinary incontinence, is a universally accepted, easily applied, short and simple index. It is an index developed for use

Table 1. Comparison of the values pre and post-treatment within groups.

Outcome measurements	PTE group (Pre.) (Mean±SD)	PTE group (Post.) (Mean±SD)	p	CS group (Pre.) (Mean±SD)	CS group (Post.) (Mean±SD)	p	Control group (Pre.) (Mean±SD)	Control group (Post.) (Mean±SD)	p
Incontinence Impact Questionnaire (IIQ7)	15.00±1.63	8.00±1.54	0.017	13.00±0.81	10.00±1.29	0.027	16.00±1.77	17.00±0.63	0.343
Urogenital Distress Inventory (UDI-6)	13.00±1.27	10.00±1.63	0.008	15.00±1.63	14.00±1.26	0.038	18.00±0.00	18.00±0.00	0.102
Incontinence Severity Index (ISI)	11.00±1.63	8.00±1.54	0.033	12.00±1.28	11.00±1.32	0.039	11.85±1.06	9.00±0.57	0.100

Table 2. Intragroup differences of the values pre and post-treatment and comparison of differences between groups.

Outcome measurements	PTE group (diff Mean±SD)	CS group (diff Mean±SD)	Control group (diff Mean±SD)	diff p	p (PTE Group-CS Group)	p (CS Group-C Group)	p (PTE Group-C Group)
Incontinence Impact Questionnaire (IIQ7)	7.00±1.63	3.00±2.00	1.00±2.44	0.000	<0.001	<0.001	<0.001
Urogenital Distress Inventory (UDI-6)	3.00±2.44	1.00±2.44	0.00±0.00	0.000	<0.001	<0.001	<0.001
Incontinence Severity Index (ISI)	3.00±2.58	1.00±1.73	2.85±1.21	0.005	>0.001	<0.001	<0.001

in epidemiological and clinical studies to identify women suffering from urinary incontinence, used in many different urinary incontinence studies, and received the highest recommendation by the second and third International Incontinence Group. ISI is a simple questionnaire with only two questions (frequency of urine leakage and its quantity) and calculates the score and categorize patients into slight (score 1–2), moderate (score 3–6), severe (scores 8–9), and very severe (score 12) [10].

Statistical analysis

Sample size was calculated using the G*power sample size calculator. When the sample size was calculated with 80% power and 0.50 effect size, the number of participants to be taken was found to be 38 ($\alpha=0.05$, $\beta=0.50$). To allow for the dropout, the sample size increased to 40 patients. SPSS (Statistical Package for Social Sciences) version 20 program was used in the data analysis of the study. Intra-group and intergroup analyses of data with normal distribution were performed with “One Way ANOVA”. The “Wilcoxon signed-rank” test was used to compare the pre and post-treatment results of the groups. Difference analysis between groups was performed with the post hoc test “Tukey HSD”. Any statistically significant differences were interpreted as being clinically worthwhile if the mean difference and the 95% confidence interval exceeded the minimum important difference.

Results

Individuals were selected from among patients who volunteered to participate in the study from Çamlica Medipol Hospital. Individuals were divided into three groups: PFE group, the CS group and the control group. The mean age of the first group was 32.60, the mean age of the second group was 35.46, and the mean age of the third group was 33.33. The comparison of pre and post-treatment evaluation parameters within the group was given in Table 1. A statistically significant difference was observed in all outcome measures in the PFE and CS groups ($p<0.05$).

Also, there was no statistically significant change in outcome measures in the control group ($p>0.05$) (Table 1).

Intra-group differences in values pre and post-treatment and comparison of differences between groups were shown in Table 2. When the values pre and post-treatment between the groups were examined, a statistically significant change was observed in UDI-6, IIQ7 and ISI ($p<0.05$). There was no significant difference between the outcome measures of the PFE and CS groups except for ISI values ($p>0.17$). Differences in both groups were similar to each other. UDI-6 and IIQ7 results in the PFE group improved more than in the CS group. When the PFE and control groups were compared, the PFE group was found to be more effective than the control group in terms of all results ($p<0.017$). Also, when the PFE and control groups were compared, the PFE group was found to be more effective than the control group in terms of UDI-6, IIQ7 and ISI results ($p<0.017$) (Table 2).

Discussion

The present study put forward that urinary symptoms decreased the PFE and CS groups. In the control group, there was no change in urinary symptoms. In addition, the improvements of the UDI-6 and IIQ7 results were more in PFE group than CS group.

It is known that pregnancy and birth process cause important physiological changes in all organs and systems. It is stated that pregnancy, labor and birth-related factors play an important role in the development of urinary incontinence [11]. Incontinence is more common during pregnancy and the postpartum period due to decreased pelvic floor muscle strength. In a study conducted to determine the prevalence, severity, and impact of incontinence on quality of life six months after vaginal birth, it was emphasized that the possibility of developing incontinence increases in the postpartum period [12].

Contraction of the pelvic floor muscles; it provides closure of the vagina, urethra and anus, cranio-ventral movement of the perineum and upward movement of the pelvic

organs [13]. They also have functions of trunk stabilization and contributing to intra-abdominal pressure. It has been stated in the literature that pelvic floor muscles are activated during abdominal muscle contraction and vice versa, that is, abdominal muscles are activated during pelvic floor muscle contraction [14]. A systematic review found that core stabilization exercise may have a positive effect on reducing urinary symptoms and significantly improve pelvic floor muscle strength, endurance, quality of life, transverse muscle strength and voiding function. Numerous studies on the effect of core stabilization exercises on urinary incontinence interventions have reported that postpartum pelvic floor exercises appear to be effective in reducing postpartum urinary incontinence [15,16]. In our study comparing pelvic floor muscle contraction and core stabilization exercises, we consider that the effect of both groups on the outcome measurements is due to the active role of the abdominal muscles.

In one study, when the differences in pelvic floor symptom scores during pregnancy and the postpartum period were examined, it was seen that in the pelvic floor exercise group, the 28th week of pregnancy and the 6-8th week after birth. The difference in change in UDI-6 and IQ7 scores between weeks was found to be significantly higher than the control group. As a result of the study, it was emphasized that pelvic floor exercises provided more improvement in urinary symptoms [17]. In one randomized controlled study, authors found UDI-6 scores in the group that performed pelvic floor muscle exercises in the last period of pregnancy and the postpartum period to be significantly lower than the control group [18]. In the meta-analysis of 335 pregnant women, it was found that urinary incontinence decreased in the postpartum period with pelvic floor exercises [19]. In our study, it was observed that the significant difference in the changes in UDI-6, IQ7 and ISI scores of postpartum women who received pelvic floor muscle training was greater than the other groups.

Nipa et al. examined the effects of core stability exercise and pelvic floor exercise on women with incontinence and divided them into the intervention (pelvic floor exercise + core stability exercise) and control groups (pelvic floor exercise only). It was observed that the amount and frequency of urine leakage were significantly reduced in the intervention group compared with the control group [20]. In our randomized controlled study, we examined the comparison of the pelvic floor exercises and core stabilization exercises. Both exercises were found to be effective, but pelvic floor exercises were more effective than core stabilization exercises in reducing urinary symptoms.

The strength of the study is that it compares the effects of two different effective exercise methods on incontinence. The limitations of the study are that a larger number of participants could not be recruited, postpartum women could not be divided according to vaginal birth or cesarean section, and long-term follow-up could not be done.

Conclusion

Pelvic floor exercises and core stabilization exercises are effective methods for reducing incontinence symptoms in the postpartum period. Pelvic floor muscle training caused more significant changes than core stabilization exercises

in women. Pelvic floor training is a effective exercise method that can be recommended to postpartum women because it is easier to implement.

Ethical approval

Ethical approval was received for this study from Istanbul Medipol University Non-Interventional Clinical Research Ethics Committee (Date: 08/06/2022, Decision No: 509).

References

1. Dumoulin C, Cacciari LP, Hay-Smith EJC. Pelvic floor muscle training versus no treatment, or inactive control treatments, for urinary incontinence in women. *Cochrane Database Syst Rev.* 2018;10(10):CD005654.
2. Wallace SL, Miller LD, Mishra K. Pelvic floor physical therapy in the treatment of pelvic floor dysfunction in women. *Curr Opin Obstet Gynecol.* 2019;31(6):485-93.
3. Torrisi G, Minini G, Bernasconi F, et al. A prospective study of pelvic floor dysfunctions related to delivery. *Eur J Obstet Gynecol Reprod Biol.* 2012;160(1):110-15.
4. Kömürçü Ö, Uğur G. Doğuma bağlı ortaya çıkan pelvik taban değişiklikleri. *Kontinans ve Nöroüroloji Bülteni.* 2017;4:25-34.
5. Özcan, Ş. Gebelikte düzenli olarak yapılan pilates egzersizlerinin mucizevi yararları. *İntegratif Tıp Dergisi.* 2015;3(2):76-7.
6. Cangöl E, Aslan E, Yalçın Ö. Kadınlarda pelvik taban kas egzersizleri ve hemşirenin rolü. *Hemşirelikte Eğitim ve Araştırma Dergisi.* 2013;10(3):49- 56.
7. Kegel AH. Progressive resistance exercise in the functional restoration of the perineal muscles. *American Journal of Obstetrics and Gynecology.* 1948;56:238-49.
8. Shumaker SA, Wyman JF, Uebersax JS, McClish D, Fantl JA. Health-related quality of life measures for women with urinary incontinence: the Incontinence Impact Questionnaire and the Urogenital Distress Inventory. *Qual Life Res.* 1994;3:291-306.
9. Uebersax JS, Wyman JF, Shumaker SA, McClish DK, Fantl JA, the Conti nence Program for Women Research Group. Short Forms to Assess Life Quality Symptom Distress for Urinary Incontinence in Women: The Incontinence Impact Questionnaire and the Urogenital Distress Inventory. *Neurourol Urodyn.* 1995;14:131-39.
10. Sandvik H, et al. Validity of the incontinence severity index: comparison with pad-weighing tests. *International urogynecology journal and pelvic floor dysfunction.* 2006;17(5): 520-4.
11. Tahan N, Arab AM, Vaseghi B, et al. Electromyographic evaluation of abdominal-muscle function with and without concomitant pelvic-floor-muscle contraction. *J Sport Rehabil.* 2013;22(2):108-14.
12. Arrue M, Ibanez L, Paredes J, Murgiondo A, Belar M, Sarasqueta C, Diez-Itza I. Stress urinary incontinence six months after first vaginal delivery. *European Journal of Obstetrics & Gynecology and Reproductive Biology.* 2010;150:210-14.
13. Tosun ÖÇ, Solmaz U, Ekin A, et al. Assessment of the effect of pelvic floor exercises on pelvic floor muscle strength using ultrasonography in patients with urinary incontinence: a prospective randomized controlled trial. *J Phys Ther Sci.* 2016;28(2):360-5.
14. Vesentini G, El Dib R, Righesso LAR, et al. Pelvic floor and abdominal muscle cocontraction in women with and without pelvic floor dysfunction: a systematic review and meta-analysis. *Clinics.* 2019;74:e1319.
15. Woodley SJ, Boyle R, Cody JD, et al: Pelvic floor muscle training for prevention and treatment of urinary and faecal incontinence in antenatal and postnatal women. *Cochrane Database Syst Rev.* 2017;12(12):CD007471.
16. Almousa S, Lamprianidou E, Kitsoulis G. The effectiveness of stabilising exercises in pelvic girdle pain during pregnancy and after delivery: a systematic review. *Physiother Res Int.* 2018;23:e1699.
17. Morkved S, Bo K. Effect of postpartum pelvic floor muscle training in prevention and treatment of urinary incontinence: a one-year follow up. *BJOG.* 2000;107(8):1022-8.
18. Ko PC, Liang CC, Chang SD, et al. A randomized controlled trial of antenatal pelvic floor exercises to prevent and treat urinary incontinence. *Int Urogynecol J.* 2011;22(1):17-22.

19. Lemos A, de Souza AI, Ferreira AL, et al. Do perineal exercises during pregnancy prevent the development of urinary incontinence? A systematic review. *Int J Urol.* 2008;15(10):875-80.
20. Nipa SI, Sriboonreung T, Paungmali A, et al. The Effects of Pelvic Floor Muscle Exercise Combined with Core Stability Exercise on Women with Stress Urinary Incontinence following the Treatment of Nonspecific Chronic Low Back Pain. *Adv Urol.* 2022;2022:2051374.