

The Effect of Pilate Exercises on Quality of Life in Women with Stress Urinary Incontinence

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ABSTRACT

Introduction: Urinary incontinence (UI) is defined by the International Continence Society as a medical condition characterised by substantial involuntary urine leakage that has a negative impact on quality of life (QOL). In this study, researchers looked into how Pilates affected the health of women with stress urinary incontinence. **Material and methods:** Two groups were formed: one that received only pelvic floor exercises and another that received both types of exercises. The participants were one hundred women (40–45 years old) with a BMI below 30 kg/m² who reported mild to moderate SUI. All groups were assessed using the Urogenital Distress Inventory Questionnaire - Short Form (UDI-6), which measures the intensity of symptoms linked to stress urine incontinence (SUI) and the International Consultation on Incontinence Modular Questionnaire-Lower urine tract symptoms. Before and after therapy, the effect of SUI on quality of life was assessed using the ICIQ LUTS QOL, a measure of this kind. **Results:** Group B exhibited noticeably reduced UDI-6 ($d = 1.16$, $p < 0.001$) and ICIQ-LUTSqol ($d = 0.45$, $p = 0.02$) scores following the treatment compared to group A, which is another discovery from this study. **Conclusions:** The evidence suggests that pilates exercises can improve quality of life for those undergoing therapy for stress urinary incontinence.

Keywords: stress urinary incontinence, pilate exercises, quality of life.

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INTRODUCTION

Stress Urinary Incontinence of urine leaks (I) occurs when intraabdominal pressure (IAP) suddenly increases, as it does while coughing, sneezing, lifting, or speeding. Obesity, menopause, a hysterectomy, or nerve damage from surgery are additional risk factors for stress urinary incontinence (SUI), however the most common cause is a decrease in pelvic muscle tone during pregnancy and delivery (National Association for Continence, 2017). According to research by Milsom and Gyhagen (2019), 26.07 percent of people experience UI, with 18.4 percent of those cases being caused by stress UI (SUI). Stress urine incontinence affects 46% of adult women, according to Abufaraj et al. (2021). Type 1 SUI occurred when the usual features of a posterior urethra-vesical angle and support for the bladder neck were not present. Due to an increase in pressure from the bladder to the urethra, incontinence would occur as the distal urethral sphincter mechanism becomes overloaded. Urinary tract hypermobility, a feature of type 2 SUI that enhances pressure transmission, is an additional complication compared to type 1 SUI. In SUI type 3, also known as intrinsic sphincteric deficit (ISD), the urethra's ability to

seal the urethral walls is compromised (Parrillo et al., 2014). Exercises that target the muscles of the pelvic floor were first suggested by kegel in 1948 as a possible solution to the problem of urine incontinence. Pelvic floor muscle (PFM) exercises can help women better control urine leaks (Joanna Briggs Institute, 2011). Pilates focuses on developing core strength, stability, attention, breath control, fluidity, and correct posture. The major focus of these exercises is on strengthening the core muscles, which include the hip and thoracic spine (Fernandes and Santos, 2016). Core strengthening and controlled breathing engage the diaphragm, multifidus, transversus abdominis, and pelvic floor muscles. Many people think Pilate can greatly improve the PFMS since most of their exercises include contracting the targeted muscle area. Respiratory mechanics, urinary continence, and sustaining intraaortic pressure (IAP) are closely related, which is why these activities are vital (Gomes et al., 2018). Core and pelvic floor strength can be achieved by breath practice in Pilates (Torelli et al., 2016). When you breathe in, your diaphragm and pelvis floor muscles extend, and when you breathe out, your transversus abdominis and pelvis floor muscles contract. These supplementary muscles provide

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support and protection for the lumbopelvic and urogenital systems and functions, as stated by Richardson et al. (2004). Pilates has long been known to improve physical health, but it also has significant positive effects on mental and emotional well-being (Smith, 2006). According to Sanioğlu and Maçkalı (2021), Pilates exercises have various positive effects on health, such as increasing flexibility, strength, and balance; lowering stress levels; and boosting general well-being. Since Pilates is an all-encompassing exercise option that challenges the mind and body simultaneously, it works wonderfully as a supplement to PFMT. Because yoga improves core strength, compliance, and postural control, it indirectly aids with health and continence (Kumar et al., 2023). Since UI impacts so many aspects of patients' lives, including their sexual function, relationships at home and at work, and overall quality of life (QOL), it can be detrimental to patients' well-being (Wang et al., 2014). For many, the mere mention of the words "wet," "dirty," or "smelly" is enough to dissuade them from engaging in activities like exercising, shopping, dancing, attending chapel, or visiting friends. Patients with UI also tend to have poor self-esteem, negative body image beliefs, and low physical attractiveness, according to research by Gümüşsoy et al. (2019). Less sexual desire, feelings of inadequacy, and stigma can lead to feelings of isolation, depression, and loneliness (Li et al., 2007). Finding out

how pilates exercises impacted the quality of life of stress urinary incontinence sufferers was the goal of this research.

MATERIALS AND METHODS

Participants

The study included 118 women who had experienced SUI. A gynaecologist was in charge of patient referrals, as shown in Figure 1. We started by verifying the eligibility of 118 people. Prior to the program's debut, an informed consent session was held after patients were educated about the study's aims and methodology. Following this, 106 participants signed an informed consent form, with 6 opting out of the study. At the end of the research period, one hundred patients were enrolled. One hundred people's data points were considered in the analysis. By means of a closed-envelope random assignment method, two groups were established. Here is the rundown of how things were chosen: Participants were adults aged 40–45 with a body mass index (BMI) lower than 30 kg/m². All the ladies who gave birth vaginally and without problems were suffering from any underlying medical disorders that could have impacted the results of this study. The gynaecologist diagnosed them with mild to moderate SUI. If a woman had a medical history of genitourinary infections, high blood pressure, diabetes, or hypertension, she could not take part in the study.

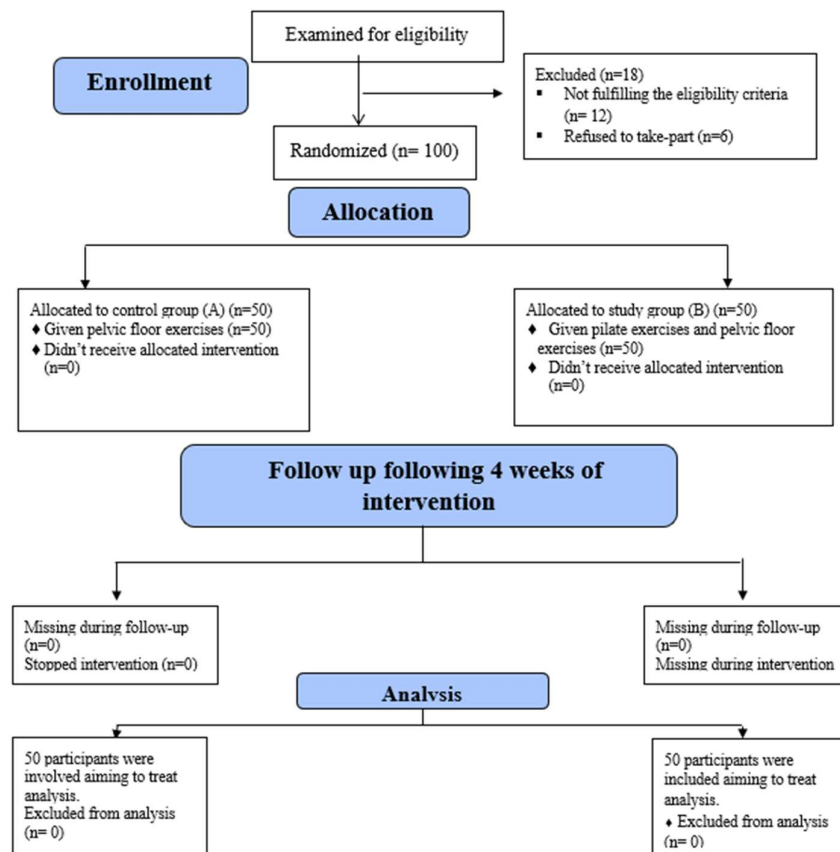


Fig. (1): The participants' flow chart throughout the study

Procedures

The samples were randomly selected using the closed envelope method. Using random assignment, one hundred individuals were split into two groups. Before the research began, patients were given a thorough explanation of all procedures. Following this, they were requested to sign an informed consent form. The Egyptian Faculty of Physical Therapy at Cairo University gave its stamp of approval to this study. This case is referenced as P.T.REC/012/006505. Outcome measure

An assessment tool for a range of lower urinary tract symptoms, including SUI, is the six-question Urogenital Distress Inventory - Short Form (UDI-6). With a score of 0, no distress is indicated, 1 means a little distress, 2 means considerable distress, 3 means severe distress and 4 means very severe anguish. Then, after you've added up all the answers, multiply the total by 25. Some possible possible scores range from 0 to 100. A higher score indicates that the symptoms are more severe. Before and after therapy, everyone in the two groups used it.

- Incontinence, as measured by the International Consultation on Modular Questionnaire for the Lower Urinary Tract To ascertain the effect of SUI on QOL, the **ICIQ LUTS QOL assesses quality of life:**

The ICIQ LUTS QOL evaluated physical limitations across everyday activities, physical exercise, and travel, as well as emotions related to SUI, such as embarrassment and odour concerns, and changes in personal relationships, including those with a partner or close friends. The 19 questions that comprised the poll were all assessed using a 4-item scale, with 1 representing not at all, 2 representing somewhat, 3 representing moderate and 4 representing very lot. Hence, a possible total score ranges from 19 to 76.

Interventions

Side crunch: To begin, roll over onto your back. Step 2: Take a deep breath to prepare Third, while exhaling, lift your left side up till your right elbow is bent over your left leg and your shoulder blades are slightly elevated off the floor. In order to return to the starting point, the fourth step is to find motivation. To go in the other direction, just turn the knob to the right.

The double leg stretch: The abdominal region's rectus abdominis is the focus of this exercise. To start, the practitioner lies on their back with their legs flexed and their hips and knees propped up by their hands. After that, they get back up to their feet and stretch their legs out without stepping on the floor.

Spinal Bridging: Before you do anything else, get down on your back and get your knees bent. Inhale deeply and spread your rib cage laterally; this is the second phase. Exhale as you slowly raise your back off the mat, bringing your knees to your shoulders in a straight line. This brings you to the third step. Keeping your abs tight, step four is to remain airborne for a few seconds. Fifth, as you gently lower yourself back to the starting position, inhale deeply.

Heel Slide: Lay flat on your back, bend at the knees, and flat on the floor. The second step is to take a deep breath in

to prepare yourself. The third step is to drag your belly button in toward your spine gentle as you exhale. Step back a little and slide your heel away from your foot to fully extend your leg. Step four is to maintain a neutral pelvis and avoid arching your lower back. Fifth, put your heel back where it came from with care and take a deep breath.

Straight leg raising: Start by laying on your back with your arms at your sides and one knee bent and the other still straight. Step 2: Breathe in deeply to become ready. Third, pull your belly button in toward your spine while exhaling slightly. The fourth step is to carefully elevate your extended leg toward the ceiling while lifting your locked knee. The fifth step is to lower your leg while inhaling.

The Clam (Clamshell): To begin, lie on your side with your knees bent at a 45-degree angle and stack your hips and feet. Step two is to maintain an upright posture by resting your head on your lower arm. Thirdly, maximise the height of your upper knee without moving your pelvis rearward. Check that your heels are touching the floor.

Chest lift: Laying on one's back with legs bent and feet flat is the starting position. Cover your chest with your forearm.

Inhalation is the second step in getting ready. Inhale deeply and bring your shoulders, neck, and head up off the floor as the third step. Examining your thighs is the fourth stage in ensuring that your abdominal wall is pulling "in" rather than "pooing" out, which would lead to increased strain on the bladder. Step five is to breathe in so you can controllably lower your back down.

Every muscle group will be worked out three times a week for 30 days, with a one-minute pause in between each round of 10 repetitions.

I told all patients in groups A and B to empty their bladders before starting pelvic floor muscle therapy (PFMT). When you do these motions, make sure to relax your abs, buttocks, and thighs. The patient may do these exercises whenever and wherever she liked while going about her ADLs. The following was prescribed to the patient for a duration of one month: three times a week, for fifteen minutes each session, perform two sets of ten exercises:

• Step (1) slow contractions:

While seated, standing, or lying down with her legs slightly apart, she should gradually tighten and pull up her pelvic floor muscles with all the effort she can muster. She ought to use maximum effort in lifting and squeezing them. You need to repeat the contraction after a four-second break. She needs to train herself to do ten gentle contractions consecutively, holding each one for 10 seconds before relaxing for 4 seconds.

• Step (2) quick contractions:

Releasing the pelvic floor muscles after a brief contraction. If you want your muscles to be really taut, try ten consecutive fast contractions. Their contractions were gradual in the first stage but rapid in the second.

Suggestions for the general public: All patient groups followed these guidelines:

1. One, first thing you should do is make it a routine to do the workouts whenever you can.
2. Tend to your pelvic floor muscles if you sense the need to control your bladder, such as just before laughing, sneezing, coughing, or lifting a heavy object.
3. Remember to drink the recommended six to eight large glasses of water daily and avoid coffee.
4. Watch your weight; extra pounds put more strain on your pelvic floor.

Statistical analysis

Unpaired t-test was conducted for comparison of subject characteristics between groups. Normal distribution of data was checked using the Shapiro-Wilk test. Levene's test for homogeneity of variances was conducted to test the homogeneity between groups. Two-way mixed

MANOVA was performed to compare within and between groups effects on UDI-6 and ICIQ-LUTSqol. Post-hoc tests using the Bonferroni correction were carried out for subsequent multiple comparisons. The level of significance for all statistical tests was set at $p < 0.05$. All statistical analysis was conducted through the Statistical Package for Social Studies (SPSS) version 27 for windows (IBM SPSS, Chicago, IL, USA).

RESULTS

- Subject characteristics:

One hundred women with stress urinary incontinence participated in this study. Table (1) shows the subject characteristics of group A and B. There was no significance difference between groups in age, weight, height and BMI ($p > 0.05$).

Table 1. Comparison of subject characteristics between group A and B:

	Group A	Group B			
	Mean $\pm$ SD	Mean $\pm$ SD	MD	t- value	p-value
Age (years)	41.92 $\pm$ 1.44	41.52 $\pm$ 1.28	0.40	1.47	0.15
Weight (kg)	72.53 $\pm$ 3.92	72.28 $\pm$ 4.59	0.25	0.29	0.77
Height (cm)	162.48 $\pm$ 2.57	161.88 $\pm$ 2.92	0.60	1.09	0.28
BMI (kg/m ²)	27.47 $\pm$ 1.31	27.57 $\pm$ 1.33	-0.10	-0.36	0.72

SD, Standard deviation; MD, Mean difference; p value, Probability value

Effect of treatment on UDI-6 and ICIQ-LUTSqol:

Two-way mixed MANOVA revealed that there was a significant interaction of treatment and time ($F = 52.99$, $p = 0.001$, $\eta^2 = 0.52$). There was a significant main effect of time ($F = 807.30$, $p = 0.001$, $\eta^2 = 0.94$). There was a significant main effect of treatment ($F = 5.13$, $p = 0.008$, $\eta^2 = 0.09$).

Comparison within group

There was a significant decrease in UDI-6 and ICIQ-LUTSqol post treatment compared with pre

treatment in both group A and group B ($p < 0.001$). The percentage of change in UDI-6 and ICIQ-LUTSqol in group A were 23.89 and 26.48% respectively and that in group B was 46.62 and 34.67%, respectively. (Table 2).

Comparison between groups

Comparison between groups post treatment revealed a significant decrease in UDI-6 ($d = 1.16$, $p < 0.001$) and ICIQ-LUTSqol ($d = 0.45$, $p = 0.02$) in group B compared with group A. (Table 2).

Table 2. Mean UDI-6 and ICIQ-LUTSqol pre and post treatment of group A and B:

	Group A	Group B			
	Mean $\pm$ SD	Mean $\pm$ SD	MD (95% CI)	p value	d
UDI-6					
Pre treatment	39.14 $\pm$ 9.20	38.63 $\pm$ 9.00	0.51 (-3.11: 4.12)	0.78	
Post treatment	29.79 $\pm$ 7.92	20.62 $\pm$ 7.93	9.17 (6.03: 12.32)	0.001	1.16
MD (95% CI)	9.35 (8.17: 10.52)	18.01 (16.84: 19.20)			
% of change	23.89	46.62			
	$p = 0.001$	$p = 0.001$			
ICIQ-LUTSqol					
Pre treatment	53.48 $\pm$ 8.52	54.80 $\pm$ 10.39	-1.32 (-5.09: 2.45)	0.48	
Post treatment	39.32 $\pm$ 7.85	35.80 $\pm$ 7.78	3.52 (0.42: 6.62)	0.02	0.45
MD (95% CI)	14.16 (12.87: 15.45)	19.00 (17.71: 20.29)			
% of change	26.48	34.67			
	$p = 0.001$	$p = 0.001$			

SD, Standard deviation; MD, Mean difference; CI, Confidence interval; p-value, probability value; d, Cohen effect size

DISCUSSION

The study's objective was to look at the relationship between pilates exercises and the quality of life for stress urinary incontinence sufferers. There was a statistically significant decrease in UDI-6 and ICIQ-LUTSqol after therapy compared to before treatment in both group A and group B, according to the study ($p < 0.001$). Group A's UDI-6 and ICIQ-LUTSqol scores changed by 23.89% and 26.48%, respectively, but group B's scores changed by 46.62% and 34.67%, respectively.

This study found that after therapy, there was a significant decrease in UDI-6 ($d = 1.16$, $p < 0.001$) and ICIQ-LUTSqol ($d = 0.45$, $p = 0.02$) when comparing group B with group A.

Consistent with El-Morsey et al. (2024), this study found that the training program had an effect on the women's comprehension of SUI. Results from the PFMT treatment included a reduced incidence of SUI and an improvement in quality of life.

Women suffering from stress incontinence or mixed incontinence reported better health after participating in clinical Pilates exercises, according to Santos et al. (2018). This improvement was accompanied by an improvement in self-efficacy and life satisfaction. That finding was likewise supported by this investigation. Engaging in these routines can assist individuals in controlling urine leakage and improving their UI management. They also improve women's social and familial lives, which increases their happiness.

Results showed less nocturia, intra-abdominal pressure, pee loss volume, and absorbent use in individuals with stress urinary incontinence, as well as better strength and endurance of the pelvic floor muscles (Balarin et al., 2013). The good results seen by the patients show that Pilates is a viable option for treating stress urine incontinence.

In addition, the results of this study are in agreement with those of Fitz et al. (2012), who discovered that there was a substantial decrease in the mean scores of the KHQ domains measuring health perception, incontinence impact, daily activity limitations, physical limitations, social limitations, personal relationships, emotions, sleep/disposition, and severity. In line with these results, one may notice a significant decrease in nighttime urine incontinence and frequency as well as an increase in physical strength and endurance. Training in PFM significantly improved the quality of life for women suffering from SUI.

Consistent with previous research, this study confirms that women with urine incontinence can reduce low back pain by strengthening the muscles in their pelvic floor and core. (Soomro et al., 2024). Reducing the frequency of episodes of urine incontinence and optimising the quality of life for these women are the goals of this exercise program.

Consistent with previous research, this study found that modified Pilates reduced incontinence severity and improved quality of life for women suffering from urine incontinence (Saleem et al., 2022). To alleviate the severity of incontinence and improve quality of life, they

discovered that a mix of modified Pilates and conventional physical therapy worked better.

When it comes to treating stress urine incontinence in postmenopausal women, this study goes against what Gonzaga et al. (2024) found in their randomised controlled trial that compared Pilates with pelvic floor muscle training (PFMT). Under the conditions of freely contracted PFMs, the trial did not detect any difference between the two approaches.

This study's findings suggesting Pilates can be an option for therapy for stress urinary incontinence are consistent with those of Qureshi (2023), who argues that the two approaches are comparable.

Strengths and limitations

Throughout the research, no adverse effects were found. Despite the constraints of our study, patients with SUI may find that Pilates and pelvic floor exercises enhance their quality of life. Contributing to these limitations are patients' mental health, noncompliance, and the lack of follow-up care. To determine Pilates's impact on PFM and QoL in the long run, more studies with SUI participants are required. For future studies to expand upon these initial findings, longer periods and a more representative sample size are required.

Clinical implications

There is strong evidence that this combination exercise plan helps women with SUI, thus physical therapists treating these patients should recommend it. The positive results in UDI-6 and ICIQ-LUTSqol suggest that the intervention may lessen the impact of SUI on this population's quality of life, which in turn could improve their health status.

Conclusion

Pilates exercises may improve quality of life and reduce stress-related symptoms of urine incontinence, according to the results.

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