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Original Article

The Effect of Eight-Week Kegel Exercise on Quality of Life in Postmenopausal Females with Urinary Incontinence

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Introduction: Urinary incontinence (UI) is the leakage of urine which is often uncontrollable and can negatively impact on the quality of life (QoL). The aim of this study was to determine the effects of an eight-week of Kegel exercise as a complementary therapy on QoL in postmenopausal females with UI.

Methods: The study design was a quasi-experimental pre-test post-test with a control group trial. The participants were Iranian women aged between 60 to 95 years with UI problems referring to medical centers in Najafabad city in Isfahan Province, Iran. Twenty four female UI patients were recruited and randomly divided into Kegel exercise (n = 12) and control group (n = 12). The Kegel group received exercise three times a week for eight-week, and the control group continued their routine life. The Questionnaire for Urinary Incontinence Diagnosis and the World Health Organization Quality of Life questionnaire were used for data collection. The variables were measured before and after the Kegel protocol in both groups. Descriptive statistics and analysis of covariance were used to assess variable differences between groups ($p < 0.05$).

Results: The mean age of UI patients was 70.83 ± 7.61 years old. Analysis of variance demonstrated a significant decrease in stress urinary incontinence symptoms ($F = 61.88$, $p = 0.01$), urge urinary incontinence symptoms ($F = 111.56$, $p = 0.01$), and UI symptoms ($F = 88.20$, $p = 0.01$), and significant increase in physical health ($F = 28.93$, $p = 0.01$), psychological health ($F = 15.35$, $p = 0.01$), social relationships ($F = 18.83$, $p = 0.01$), environment health ($F = 155.51$, $p = 0.01$), QoL ($F = 132.07$, $p = 0.01$) in Kegel exercise group.

Conclusion: Kegel exercise can be an effective complementary therapy for improving QoL in postmenopausal female suffering from UI. Healthcare providers should consider recommending Kegel exercise as part of comprehensive treatment approach for postmenopausal female with UI to help alleviate symptoms and enhance their overall QoL.

Keywords: Urinary Incontinence, Exercise Therapy, Quality of Life, Postmenopausal, Aging

Introduction

Urinary incontinence (UI) refers to the involuntary loss of urine. There are several type of UI including stress urinary incontinence (SUI), and urge urinary incontinence (UUI). In SUI, urine leaks occurring during physical activities, such as coughing, laughing, sneezing, or exercise that often caused by weakened pelvic floor muscle or damage to urethral sphincter. In UUI, a sudden, strong urge

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to urinate that is difficult to control, which may be caused by an overactive bladder muscle or neurological issues (1). Both conditions can disrupt daily life and may signal underlying health issues, which can negatively impact on the quality of life (QoL) (2). There are different reasons that cause UI, such as pelvic floor disorder, obesity, diabetes, menopause, multiple sclerosis, enlargement prostate, and after prostate cancer surgery (3, 4). The menopausal transition is a biological situation that hormone levels change rapidly and pelvic floor muscles are weaker, also could be associated with mental health and physiological systems and functions (5). It appears between 45 and 55 years old, and about one-third of woman's life is spent in the postmenopausal period (6). UI is one of the menopausal symptoms (7), which may be due to hypoestrogenism and urogenital atrophy (8). Aging, pregnancy, vaginal delivery, and surgery are the main factors to cause weaken the pelvic floor muscles, which causes pelvic organ prolapses and UI (9). Most studies report the prevalence of any UI in the range of 25-45%, and strongly related to the age of the woman (10) gradually increasing to 40% among older women (11). In the elderly, UI is rarely reported because of a sense of shame (12). Many patients regard this condition as an integral part of aging and avoid situations in which UI is possible, which limits daily activities, sexual activity, sports, and other areas of life, causing decline their QoL (12-14). It has been reported UI affects QoL, and the ability of females to participate in normal everyday life (15). Several studies have been conducted on the effect of pelvic floor exercises on UI, most of them noted an improvement in UI and QoL (16, 17). Pelvic floor muscle training significantly enhances QoL in females with UI and is a key factor in modifying physical, mental, and social functions (2, 15, 18). In 1948, Dr. Arnold Kegel described pelvic floor muscles strengthening. He designed the protocol of training by using a perineometer (vaginal manometer) to record the contraction of pelvic floor muscles and control the performance of exercise to correct pelvic floor muscles (9). Kegel exercise, as specific pelvic floor muscles training, has been noticed and demonstrated effective results in improving UI disorder (15, 19-22). The basis of Kegel exercise is based relies on the strong contractions of the pelvic floor muscles to close the urinary sphincter and prevent involuntary UI or leakage of urine during increasing intra-abdominal pressure. Considering the prevalence of UI in elderly females and Kegel exercise as a non-invasive method, it could be a reasonable, and complementary treatment. Limited studies have been conducted on the impact of pelvic floor muscle exercise on UI in postmenopausal females in Iran (23, 24). This study examines the effect of eight weeks of Kegel exercise on QoL and UI in postmenopausal females with UI.

Methods

Study design

This quasi-experimental, randomized control trail was conducted in Najafabad city, Isfahan province of Iran, 2022. The participants were selected based on convenience sampling from among 48 women aged between 60 to 95 years with UI problems who had referred to medical centers in Najafabad city. The inclusion criteria were female, age ≥ 60 years, have symptoms of UI according to the Questionnaire for Urinary Incontinence Diagnosis (25), ability to contract pelvic floor muscles (26); permission of physical activity by a doctor, no pathological disorder of the spine, vertebral, or pelvic, no previous surgery for UI, no medication use for UI, no recent or recurrent urinary tract infection. The exclusion criteria was not participating in two consecutive training sessions.

The G-power 3.1 software was used to compute the required effect size-given α, power, and sample size by setting the statistical test as ANCOVA: Fixed effects, main effects, and interactions. The results have been shown in Table 1.

The clinical effect is calculated as the difference between pre-test and post-test value in percent by using the formula % = [(post-test – pre-test)/ pre-test] × 100 .

Participants

Forty-eight participants out of the 98 patients with UI problems who visited the medical centers in Najafabad city met the eligibility criteria for participation in the study. Twenty-four participants (age= 70.83 ± 7.61 yr., weight = 71.00 ± 8.78 Kg, BMI =26.73 ± 4.49 Kg.m-1) were selected through convenient sampling, as they were willing to participate in the study, and were randomly divided to Kegel exercise (n = 12) and control groups (n = 12).

Intervention

The study group received Kegel exercise for eight-week, three days per week. Each session was 45-60 minutes long. A 10-minute warm-up consisting of stretching and fast walking preceded each session. The protocol of Kegel exercise is described in Table 2. The Kegel exercise consisted of eight exercise movements: squeeze and release, butterfly, squat, single leg v-ups, hip thrust, bird dog, bridge, and reverse plank, which were performed for the eight weeks. During the Kegel exercises, it is important to ensure that the bladder is empty. A 10-minute cool-down at the end of the session consisted of fast walking, gradually decreasing the speed, and stretching. The control group continued with their previous lifestyle. The pre-test was done a day before and the post-test was done a day after the end of protocol of training. The questionnaires were completed with the help of researcher. The protocol of Kegel exercise was done in one of private sports club in Najafabad city.

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Instrumentation

Demographic questionnaire: This consisted of age, BMI, occupation, education level, marital status, menopause status, duration, and frequency of UI occurrence.

The Questionnaire for Urinary Incontinence Diagnosis (QUID): This questionnaire defines the presence and frequency of SUI and UUI symptoms (27), and consists of six items. Three items focus on SUI symptoms and three items focus on UUI symptoms. Each item consists of six Likert scales, ranging from none of the time=0, rarely=1, once a while=2, often=3, most of the time=4, all of the time=5. The answer to items 1,2, and 3 for the urinary stress score and 4,5, and 6 for the urinary urge score are added together (25, 27). The Persian version of QUID, which was valid and reliable was used (28).

The World Health Organization Quality of Life Scale (WHOQOL-BREF): This questionnaire is self-report and consists of 26 items. Two items measure QoL and general health, and 24 items for four domains of QoL: physical health (7 items), psychological health (6 items), social relationships (3 items), and environmental health (8 items). Each item scored from 1-5, which is defined as a five-point ordinal scale. The scores are linearly from 0-100 scale, and the raw score range of each domain consists of physical health (7-35), psychological health (6-30), social relationships (3 -15), and environmental health (8-40) (29-31). The Persian version of WHOQOL-BREF which was valid and reliable was used (32).

Statistical analysis

In this research, descriptive analysis was used to report the mean and the standard deviation of variables measured as pre- and post-tests in both groups. The normal distribution was verified using Shapiro-Wilk Test ($p > 0.05$). The homogeneity of variance of variables was assessed using Levene's Test ($p > 0.05$). Differences between groups were assessed using Analysis of covariance (ANCOVA) ($p < 0.05$) by employing SPSS version 12 software.

Ethical considerations

The study protocol was approved by the Research Ethics Committee of the Islamic Azad University-Najafabad branch (IR.IAU.NAJAFABAD.REC.1401.41). All subjects signed written informed consent.

Results

Kegel exercise had a significant decrease in SUI symptoms, UUI symptoms, and UI symptoms and a significant increase in physical health, psychological health, social relationships, environment health , and QoL in Kegel group (p-value < 0.05), which has been shown in Table 3 and 4, respectively.

Discussion

The main purpose of this study was to investigate the effect of Kegel exercise on QoL in postmenopausal females with UI. The results showed Kegel exercise group experienced significant improvements compared to the control group that did not receive any intervention: Decrease in clinical effect: SUI symptoms (51.32%), UUI symptoms (61.49%), and UI symptoms (57.27%), and increase in QoL domains: physical health (15.99%), psychological health (28.34%), social relationships (19.78%), environment health (53.49%), and QoL (15.38%).

Table 1. The required effect size (medium, effect size f = 0.25) for ANCOVA analysis

Input	Effect size f	0.25
	β/α ratio	1
	Total sample size	24
	Numerator df	1
	Number of groups	2
	Number of covariates	1
Output	Noncentrality parameter λ	1.5000000
	Critical F	0.8624692
	Denominator df	21
	α err prob	0.3636012
	β err prob	0.3636012
	Power (1-β err prob)	0.6363988

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Table 2. The protocol of Kegel exercise for eight-week

Week	Session one	Session two	Session three
One	– Butterfly 1×10s – Squat with pelvic floor 1×10s – Single leg v Ups 1×10-12 – Squeeze and Release 3×10 – Hip thrust 1×10-12 – Squeeze and release – 3 min rest between each set of exercise – 30 sec. rest between each repetition of set	– Butterfly 2×10s – Squat with pelvic floor 1×10s – Squeeze and Release 3×10 – Single leg v Ups 2×8-10 – Hip thrust 2×8	– Butterfly 3×10s – Squat with pelvic floor 2×8-10s – Squeeze and Release 3×10 – Single leg v Ups 3×8 – Hip thrust 2×8-10
Two	– Butterfly 3×10s – Squat with pelvic floor 3×5s – Squeeze and Release 3×10 – Single leg v Ups 3×5 – Hip thrust 3×10 – 3 min rest between each set of exercise – 30 sec. rest between each repetition of set	– Butterfly 3×10s – Squat with pelvic floor 3×5-8s – Squeeze and Release 3×10 – Single leg v Ups 3×5-8 – Hip thrust 3×10	– Butterfly 3×10s – Squat with pelvic floor 3×8-10s – Squeeze and Release 3×10 – Single leg v Ups 3×8-10 – Hip thrust 3×10
Three	– Butterfly 3×10s – Squat with pelvic floor 3×10s – Squeeze and Release 3×10 – Single leg v Ups 3×10 – Hip thrust 3×10 – 20 sec. rest between each repetition of set – 3 min rest between each set of exercise	– Butterfly 3×10s – Squat with pelvic floor 3×10s – Squeeze and Release 3×10 – Single leg v Ups 3×10 – Hip thrust 3×10 – Bird dog exercise 1×10	– Butterfly 3×10s – Squat with pelvic floor 3×10s – Squeeze and Release 3×10 – Single leg v Ups 3×10 – Hip thrust 3×10 – Bird dog exercise 2×10
Four	– Butterfly 3×10s – Squat with pelvic floor 3×10s – Single leg v Ups 3×10 – Squeeze and Release 3×10 – Hip thrust 3×10 – Bird dog exercise 3×10 – 20 sec. rest between each repetition of set – 3 min rest between each set of exercise	– Butterfly 3×10s – Squat with pelvic floor 2×10s – Single leg v Ups 2×10 – Squeeze and Release 3×10 – Hip thrust 3×10 – Bird dog exercise 2×10	– Butterfly 3×10s – Squat with pelvic floor 2×10s – Single leg v Ups 2×10 – Squeeze and Release 3×10 – Hip thrust 3×10 – Bird dog exercise 2×10
Five	– Butterfly 3×10s – Bird dog exercise 1×10s for each side – Bridge 1×10 – Squeeze and release 3×20 – Reverse Plank 1×10	– Butterfly 3×10s – Bird dog exercise 1×10s for each side – Bridge 2×10 – Squeeze and Release 3×20 – Reverse Plank 1×10	– Butterfly 3×10s – Bird dog exercise 1×10s for each side – Bridge 3×10 – Squeeze and Release 3×20 – Reverse Plank 1×10

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	– 20 sec. rest between each repetition of set – 3 min rest between each set of exercise		
Six	– Butterfly 1×12 seconds – Bird dog exercise 1×10s for each side – Squeeze and Release 3×20 – Bridge 1×10 – Reverse Plank 1×10 – 20 sec. rest between each repetition of set – 3 min rest between each set of exercise	– Butterfly 1×12 seconds – Bird dog exercise 1×10s for each side – Squeeze and Release 3×20 – Bridge 2×10 – Reverse Plank 2×10	– Butterfly 1×12 seconds – Bird dog exercise 1×10s for each side – Squeeze and Release 3×20 – Bridge 3×10 – Reverse Plank 3×10
Seven	– Bird dog exercise 2×10s for each side – Squeeze and Release 3× until feel pelvic floor muscle fatigue – Bridge 2×10 – Reverse Plank 2×10 – 20 sec. rest between each repetition of set – 3 min rest between each set of exercise	– Bird dog exercise 2×10s for each side – Squeeze and Release 3× until feel pelvic floor muscle fatigue – Bridge 3×10 – Reverse Plank 2×10	– Bird dog exercise 2×10s for each side – Squeeze and Release 3×until feel pelvic floor muscle fatigue – Bridge 3×10 – Reverse Plank 2×10
Eight	– Bird dog exercise 3×10s for each side – Bridge 3×10s – Squeeze and Release 3× until feel pelvic floor muscle fatigue – Reverse Plank 3×10s – 20 sec. rest between each repetition of set – 2 min rest between each set of exercise	– Bird dog exercise 3×10s for each side – Bridge 3×10s – Squeeze and Release 3× until feel pelvic floor muscle fatigue – Reverse Plank 3×20s	– Bird dog exercise 3×10s for each side – Bridge 3×10s – Squeeze and Release 3× until feel pelvic floor muscle fatigue – Plank 3×30s

– 10 min warm-up, and 10 min cool-down were down in the beginning and the end of each session, respectively.
s: second, UI: Urinary Incontinence; $p < 0.05$.

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Table 3. Descriptive statistics of pre-test and post-test of UI symptoms variables in both groups

Statistic Variable	Test	Kegel exercise N = 12		Control N = 12		F	p	Eta	Observed Power
		Mean	SD	Mean	SD				
SUI symptoms	Pre-test	9.41	2.19	10.33	2.38	61.88	0.01	0.74	61.88
	Post-test	4.58	1.56	11.83	2.69				
UUI symptoms	Pre-test	11.83	1.64	11.33	1.66	111.56	0.01	0.84	1.00
	Post-test	4.50	1.93	11.58	2.96				
UI symptoms	Pre-test	21.25	3.25	21.66	2.87	88.20	0.01	0.80	1.00
	Post-test	9.08	3.26	23.41	5.51				

SUI: Stress Urinary Incontinence; UUI: Urge Urinary Incontinence; UI: Urinary incontinence.
***ANCOVA test was used as statistical test; p < 0.05.**

Table 4. Descriptive statistics of pre-test and post-test of QoL in both groups

Statistic Variable	Test	Kegel exercise N = 12		Control N = 12		F	p	Eta	Observed Power
		Mean	SD	Mean	SD				
Physical health	Pre-test	37.20	5.15	33.33	7.03	282.93	0.001	0.460	0.999
	Post-test	43.15	8.26	24.10	5.66				
Psychological health	Pre-test	36.45	7.56	38.54	11.53	153.95	0.001	0.460	0.959
	Post-test	46.87	13.54	26.38	8.39				
Social relationships	Pre-test	63.19	10.92	59.02	10.33	188.35	0.001	0.511	0.984
	Post-test	75.69	16.46	48.61	9.28				
Environment health	Pre-test	33.59	8.95	30.72	8.92	1555.41	0.001	0.896	1.000
	Post-test	51.56	5.57	15.10	7.15				
QoL	Pre-test	40.62	12.06	44.79	12.45	132.07	0.001	0.868	1.00
	Post-test	46.87	16.10	18.75	9.97				

QoL: Quality of Life.
***ANCOVA test was used as statistical test; p < 0.05**.

Most studies have addressed UI correction in postmenopausal females following Kegel exercise or Pelvic Floor Muscle Exercise (PFME) (21, 22, 33-35). The impact of UI on QoL is evident, and the treatment and UI correction improve QoL (15). Most studies that have addressed the UI correction in postmenopausal females following Kegel exercise or PFME have considered the QoL as an outcome. These studies have reported that QoL improved after the UI correction intervention (15, 31, 36-38). Our result was in line with other studies (15, 31, 34), although the QoL questionnaires used were not similar to our QoL questionnaire. UI, defined as the involuntary leakage of urine, which could be caused by loss of pelvic support (39), and significantly impact in individual's QoL. It could lead to physical discomfort, social embarrassment, psychological distress, and negatively affect a person's well-being.

Our study showed a significant reduced both SUI and UUI symptoms in the Kegel exercise group, leading to improvement in all four dimensions of QoL. Moreno et al., in a semi-experimental study reported PFME was noted as an effective and low-cost treatment for SUI rehabilitation, and QoL (33). Kashanian et al., reported a significant improvement in the severity of UI (34). Nilsen et al., showed after 4 and 6 weeks, Kegel exercise reduced urinary leakage in females with SUI (21). Aksac et al., noted that pelvic floor muscle exercises are effective for the treatment of SUI following three times a week for two months as a home program (35). Kegel exercise as a kind of PFME showed the strengthening of the weaker pelvic floor muscle such as the levator ani and the iliococcygeus (36), that are attached to the bony pelvic outlet with ligaments which supports the pelvic organs (39, 40), could be included in first-line conservative management of female with UI (17, 33, 41, 42).

Conclusion

Kegel exercise strengthens pelvic floor muscles, improves bladder control and preventing urinary leakage. Kegel exercise positively impacts mental health, boots confidence, and reduce anxiety related to UI. Kegel exercise offer a non-surgical method to alleviate SUI, and UUI symptoms, as a complementary therapy to improve QoL in postmenopausal female with UI.

Study limitations

There are several limitations to this study such as: single-center study, small sample size, convenience sampling, short intervention duration, lack of long term follow-up, self-report outcomes. The study was conducted in a single city (Najafabad) within Iran, which may limit generalizability of findings to the other geographic regions or populations. A small sample size (24 participants, with 12 in the Kegel exercise group and 12 in the control group) may limit

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generalizability of findings and the ability to detect significant differences between groups. The convenience sampling may not be representative of the broader of population of postmenopausal female with UI. The protocol of exercise was only implemented for an eight-week duration, and a longer intervention duration may observe more changes in QoL and UI symptoms. The study did not long-term follow-up period, so it is not clear, the improvements observed would be maintained over a longer period. The study relied on self-reported measure base on used questionnaires, which may be subject to response bias.

Conflict of interest

The authors declared no conflict of interest.

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Authors' Contribution

E.E and E.A contributed to the research methods.
E.E has done supervision with of E.A.
E.E has done data analysis.
E.E wrote the manuscript.
All authors read the manuscript and verified it.

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