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Pelvic Floor Muscle Training Instruction to Control Urinary Incontinence and its Resulting Stress, Anxiety and Depression in Patients with Multiple Sclerosis

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Abstract

Background: Urinary disorders are common problems in patients with multiple sclerosis (MS). Urinary incontinence largely affects the physical, social and emotional characteristics and activities of such patients.
Objectives: The current study aimed to identify the effect of pelvic floor muscle training on urinary incontinence and its resulting stress, anxiety and depression in patients with MS.
Methods: The present clinical trial with a pre-post design was conducted on 50 patients with MS referring to the MS clinic of Imam Khomeini hospital in Tehran, Iran, selected by convenience sampling method. Participants received instructions on pelvic floor muscle exercises and then practiced for three consecutive months. The international consultation on incontinence questionnaire-urinary incontinence short form (ICIQ-UI-SF) was used to measure participants' urinary incontinence, and the 21-item depression, anxiety and stress scale (DASS-21) to measure their depression, anxiety and stress, both before the intervention and at the end of the third month of exercising. The obtained data were analyzed by SPSS16 using descriptive statistics and the dependent t test.
Results: About 45 (90%) participants practiced pelvic floor muscle exercises until the end of the third month. The frequency and amount of urine leakage and the effect of urinary incontinence on the quality of life differed significantly in the patients after the instructions compared to the status before the intervention ($P < 0.001$). The mean score of stress ($P < 0.001$), anxiety ($P = 0.04$) and depression ($P = 0.003$) decreased significantly after the intervention.
Conclusions: According to the findings, instructing pelvic floor muscle exercises was effective in reducing urinary incontinence and its resulting stress, anxiety and depression in patients with MS. These exercises were recommended as a non-pharmacological, non-invasive and cost-effective method to control urinary incontinence in patients with MS.

Keywords: Pelvic Floor Muscle Training, Stress, Anxiety, Depression, Multiple Sclerosis

1. Background

Chronic multiple sclerosis (MS) is diagnosed with a range of unpredictable symptoms and periods, such as impaired body coordination and balance, fatigue, visual disturbances, sensory changes, sensitivity to heat, cognitive and emotional disorders and bladder and bowel dysfunction (1).

There are about 2.5 million people with MS worldwide (2). The prevalence of MS is reported as 5 - 30 per 100,000 people in Iran (3). Iran was previously among the regions with a low prevalence of MS; however, over the last decade, the number of patients with MS increased and the prevalence of MS appears to have increased to a moderate or even high level in Iran (4).

There are no cures for MS, and treatments are therefore based on the regulation of the immune system with interferon-beta, controlling the symptoms and non-pharmacological interventions (5). About 84% of patients with MS have lower urinary tract dysfunction (6). The most frequent bladder dysfunction in MS is an overactive bladder, which causes urinary incontinence (7). Urinary incontinence affects the social, psychological, occupational, familial and physical aspects of the patients' lives and limits their ability to enjoy daily activities, social relations, traveling and personal relationships and imposes heavy costs on the patients and the healthcare systems (8, 9). Psychological manifestations of MS include anxiety, stress, depression, cognitive disorders, irritability and anger, with the

most prevalent ones being anxiety, stress and depression (10). About 48% of patients experience anxiety, stress and depression in the first year of diagnosis with MS, and these symptoms tend to highly affect the patients' quality of life (11). In addition to being a disease by itself, urinary incontinence exacerbates depression, anxiety, stress, insomnia and other psycho-social problems in patients with MS and negatively affects the quality of life as a common complication (8). Patients with MS, who are mostly in their youth, are embarrassed by problems such as urinary incontinence and find their self-confidence faltered (12).

Urinary incontinence is treated by methods such as surgery, hormone therapy, pharmacotherapy, electrical stimulation, pelvic floor muscle exercises and mechanical devices. The pharmacotherapy method uses anticholinergic (antimuscarinic) drugs, with numerous side effects, such as constipation, dizziness, urinary retention and skin rash (13-15). In addition to posing the risk of urinary incontinence relapse, surgical methods require the appropriate facilities and a highly competent surgeon impose heavy costs and may also cause other complications (16). Pelvic floor muscle exercises are alternative solutions that play a major role to prevent and treat urinary incontinence (17). Given the many complications that pharmacotherapy causes, it appears reasonable to opt for non-pharmacological methods of reducing anxiety, stress and depression in patients with MS (18).

Complications such as fatigue and bladder and bowel problems can be managed and improved through proper instructions and treatments (19). Through the improvement of complications, the patient can perform a higher-quality self-care and reduce his psychological problems (20). Given the high prevalence of urinary incontinence in patients with MS, and given that pelvic floor muscle exercises are non-pharmacological, non-invasive and cost-effective method to control urinary disorders in the patients that can be easily instructed by the medical personnel, including nurses and given the lack of published research on the effect of pelvic floor muscle training on urinary incontinence, stress, anxiety and depression in MS patients in Iran.

2. Objectives

The present study aimed to determine the effect of instructing pelvic floor muscle training to control urinary incontinence and its resulting stress, anxiety and depression in patients with MS.

3. Methods

The present single-arm clinical trial with a pre-post design was conducted on 50 patients with MS referring to the MS clinic of the Iranian center of neurological research in Imam Khomeini state hospital of Tehran, Iran, from February 2014 to July 2014 selected through convenience sampling and based on the study inclusion and exclusion criteria. Based on previous studies and considering the significance level of 95% and test power of 90%, sample size was calculated as 42 subjects, which was extended to 50 for a probable sample loss of 20%.

The study inclusion criteria consisted of experiencing urinary incontinence caused by MS based on a neurologist's diagnosis, an expanded disability status scale (EDSS) score lower than seven; the EDSS is a neurological scale that grades the level of disability in MS with a score that ranges from 0 (normal neurological findings) to 10 (death due to MS); being literate, aged 18 - 50, no severe cognitive disturbances, no MS attacks experience over the last three months, not being pregnant, no urinary incontinence drug doses change over the month preceding the study -if taking any-, not using diuretic drugs and antihypertensives, no history of major physical conditions and disorders affecting the urinary tract such as chronic heart and pulmonary diseases, urinary tract infection, diabetes or pelvic and prostate surgeries, being menopausal, no history of gynecologic and prostate surgeries, no history of benign prostatic hyperplasia, no history of cesarean section or vaginal delivery during the last six months and no excessive fatigue making the patient incapable of performing exercises. The study exclusion criteria consisted of unwillingness to continue participation in the study for any reason, the incidence of acute medical conditions, the incidence of acute MS attacks and changes in the urinary incontinence drug doses during the study.

3.1. Intervention

The participants then completed the demographic questionnaire. Items related to the body mass index (BMI), type of MS, and EDSS scores before and after the training were marked by the researcher. Before the initiation of the study, the patients' EDSS scores were determined by a neurologist (as mentioned earlier, only individuals with scores lower than seven were included). The absence of urinary tract infection was confirmed through the normal results of urinalysis or urine culture.

Then, participants completed the incontinence questionnaire-urinary incontinence short form (ICIQ-UI-SF) to measure their degree of urinary incontinence and the DASS-21 to measure their stress, anxiety and depression. A female colleague provided instructions on

pelvic floor muscle exercises to the female patients. The researcher and his assistant had received the necessary instructions from reliable sources and under the supervision of a wound, ostomy and continence nurse. The intervention instructions were based on the adult learning theory. In this theory, the individual was allowed to take care of some of the learning by himself to acquire what suits an adult through self-control, according to the particular living conditions of an adult and his mental, physical and experiential growth characteristics (21, 22).

The patients received individual, face-to-face training in the MS clinics. Female patients were trained by a female colleague. The subjects were first briefed about the anatomy and function of the urinary tract and the etiology, symptoms, complications, and treatment methods of urinary incontinence in patients with MS. Then they were provided with relevant pamphlets and pictures and lectured about pelvic floor muscle exercises. To identify muscles involved in urination, the patients were instructed to stop their flow of urine midstream for three seconds (but not to repeat this exercise too often). Then they were asked to lie in a supine position with their knees bent and to squeeze the same muscles (as they did to stop urination) while they were breathing gently through the mouth and keeping all other pelvic muscles relaxed. They could gradually do the exercises in sitting and standing positions as well. The subjects were recommended to start by holding the squeezes for three seconds and resting for five seconds. The goal was to increase the duration of each contraction to 10 seconds and to do 90 - 100 contractions a day (depending on each patient's ability and level of fatigue). The participants had to do the exercises three times a day (the timing was determined by the patients) for 12 consecutive weeks at home. Educational pamphlets about urinary incontinence in patients with MS and pelvic floor muscle exercises were also distributed among the subjects.

To facilitate follow-up, each patient was provided with self-report checklists containing the number of muscle contractions at each time of practice, total number of muscle contractions per day, and the total time dedicated to the exercises. The participants were asked to complete the checklists every day. To resolve any probable problems and ensure the execution of the exercises, the researcher attended the MS clinic once a week and also phoned the patients weekly during the first month and at the end of the second and third months of the intervention.

Participants completed the ICIG-UI-SF, the DASS-21 and the self-report checklists three months after the instructions. Participants not willing to continue cooperation or not performing the exercises regularly were excluded from the study.

3.2. Questionnaire

The data collection tools included a demographic characteristics questionnaire, the ICIQ-UI-SF and the DASS-21.

The ICIQ-UI-SF measures the degree of urinary incontinence and gives it a score on a range of 0 - 21, where higher numbers in any part indicate a worse urinary incontinence. This questionnaire examines the frequency, amount and duration of urine leakage and its effect on the quality of life. Numerous studies used this tool (23-25), and its reliability and validity were confirmed in Iran with a Cronbach's alpha of 0.75 (26).

The DASS-21 consists of a total of 21 items, with seven items each dedicated to measuring the three symptoms, i e, anxiety, depression and stress. This scale was first introduced in 1995 by Lovibond (27) and ever since is used in various foreign studies (28-30). The reliability and validity of this scale is confirmed for patients with MS in Iran ($r = 0.89$) (31).

This scale is designed based on a four-point Likert scale (0 = never to 3 = high). Stress, depression and anxiety are measured with seven items given scores from 0 - 21 and higher scores indicate higher levels of anxiety, depression or stress. In the current study, the pre- and post-intervention scores obtained in each part were compared and the patient's stress, anxiety and depression thereby evaluated.

3.3. Ethical Considerations

The current study was approved by the ethics committee of Tehran University of Medical Sciences under registration no.: 92/D/130/2715, registered in the Iranian registry of clinical trials (IRCT ID: IRCT2014010416063N1). Upon their recruitment, the patients were asked to sign an informed consent form and provide their phone numbers (for follow-up).

The obtained data were transferred into SPSS 16.0 (SPSS Inc., Chicago, IL, USA) and analyzed using descriptive statistical tests, independent T-tests and the Pearson correlation coefficients.

4. Results

About 45 patients finished the intervention successfully; two patients were excluded from the study due to MS attacks and hospitalization, two due to their failure to perform the pelvic floor muscle exercises regularly, and one due to an unwillingness to continue participation in the study. The demographic and clinical characteristics of participants are shown in Table 1.

The total ICIQ-UI-SF score decreased significantly after the intervention ($P < 0.001$). The frequency and amount of

Table 1. Characteristics of the Subjects With Multiple Sclerosis (N = 50)

Variable	Categories	No. (%)
Age, y	18 - 30	14 (31.1)
	31 - 40	11 (24.4)
	41 - 50	20 (44.4)
Body mass index	15 - 18.5	4 (8.9)
	18.51 - 24.9	23 (51.1)
	Over 24.9	18 (40)
Type of MS	Relapsing-remitting	38 (84.4)
	Secondary progressive	7 (15.6)
Duration of MS, y	1 - 6	18 (40)
	7 - 13	17 (37.8)
	14 - 20	10 (22.2)
Duration of urinary incontinence, y	Under one year	14 (31.1)
	1 - 3	20 (44.4)
	3 - 5	8 (17.8)
	Over 5 years	3 (6.7)
Use of drugs for urinary incontinence	Yes	14 (31.1)
	No	31 (68.9)
Expanded disability status scale score	0 - 2	13 (28.9)
	2.5 - 4.5	22 (48.9)
	5 - 6.5	10 (22.2)
Frequency of MS relapses over the past year	Without relapse	23 (51.1)
	Once	16 (35.6)
	Twice	3 (6.7)
	More than twice	3 (6.7)

urine leakage differed significantly post-intervention compared to pre-intervention ($P < 0.001$) (Table 2). After the intervention, urine leakage disappeared completely in less than one fourth of the patients (n = 12) and decreased to once a week in almost half of the patients (42.2%). Only two participants reported a post-intervention urine leakage as frequent as several times a day.

The results revealed that the mean score of stress ($P < 0.001$), anxiety ($P = 0.04$) and depression ($P = 0.003$) significantly decreased with three months of pelvic floor muscle exercises meant to reduce urinary incontinence (Table 3).

5. Discussion

The results showed that the total ICIQ-UI-SF score significantly decreased after the intervention ($P < 0.001$). In other words, receiving instructions on pelvic floor muscle exercises improved urinary incontinence in patients with MS. The post-intervention frequency and amount of urine leakage differed significantly compared to the status before the intervention.

The results of a study by Lucio et al. (23) showed that giving instructions on pelvic floor muscle exercises to females with MS resulted in a significant decrease in the mean post-intervention ICIQ-SF score obtained, consistent with the results of the present study.

In their study, Seyedrasouli et al. (32) concluded that the frequency of urine leakage ($P = 0.001$), amount of urine leakage ($P = 0.001$) and the effect of urine leakage on the quality of life ($P = 0.04$) and also the total ICIQ-UI-SF score ($P = 0.001$) decreased significantly in participants after three months of practicing pelvic floor muscle exercises and focusing on bladder care instructions and lifestyle improvement measures, consistent with the results of the present study.

Some studies indicated that guided pelvic floor muscle exercises, such as the use of vaginal cones and electrical and biophysical stimuli, were more effective to control this problem (16). A study comparing several methods of treating urinary incontinence, including vaginal cones, electrical stimuli and pelvic floor muscle exercises and also a no-treatment method showed no differences between the first three methods to control urinary incontinence, but that all three were more effective than the no-treatment method (33).

The results of the present study showed that the mean

Table 2. Urinary Incontinence Before and After the Intervention

Questionnaire Scores	Before, Mean ± SD	After, Mean ± SD	Paired T-Test Result
Total scores of ICIQ-UI-SF	10.48 ± 4.65	4.93 ± 3.58	T = 12.37; P < 0.001

Abbreviation: ICIQ-UI-SF, questionnaire-urinary incontinence short form.

Table 3. Stress, Anxiety and Depression Before and After the Intervention

DASS-21 Questionnaire Scores	Before, Mean ± SD	After, Mean,± SD	Paired T-Test Result
Stress	11.08 ± 4.55	8.22 ± 4.93	P < 0.001; t = 7.11
Anxiety	8.22 ± 5.37	6.68 ± 6.82	P = 0.04; t = 2.06
Depression	8.75 ± 4.85	7.57 ± 4.86	P = 0.003; t = 3.14

Abbreviation: DASS-21, 21-item depression, anxiety and stress scale.

score of stress (P < 0.001), anxiety (P = 0.04) and depression (P = 0.003) significantly decreased after three months of practicing pelvic floor muscle exercises to control urinary incontinence. Given that the stress, anxiety and depression are strongly associated with one another in patients with MS, it can be argued that the reduction of any of these three conditions can be effective to reduce the other conditions as well (18).

Innerkofler et al. (34) conducted a study to compare the effect of surgery with the effect of providing instructions on pelvic floor muscle exercises on urinary incontinence, quality of life, anxiety and depression in female patients with stress urinary incontinence, and showed that the level of anxiety decreased in both groups after the intervention, but that the difference was statistically significant in the case group while the variation in depression did not differ significantly between the two groups before and after the intervention. The results obtained in the cited study on anxiety and depression were not consistent with the results of the present study, which could be due to comparisons made between an invasive method, such as surgery, and a non-invasive method, such as providing instructions on pelvic floor muscle exercises. Moreover, participants of the cited study were females only, while the present study examined both genders, which might be another possible reason for the inconsistent results. One study examined the effect of journaling on anxiety and stress in patients with MS and revealed a significant decrease in the mean scores of anxiety and stress one month after the intervention in both the case and the control groups (18), consistent with the results of the present study. Ghasemi et al. (8) found significant differences between both the physical and mental aspects of the quality of life in patients with MS with urinary incontinence in the Swiss ball group and the biofeedback group before the treatment compared to that of the after treatment. The comparison of the physical states in the two groups after the treatment showed the higher effectiveness of the therapeutic Swiss ball exercises compared to the biofeedback method, which might be due to the active participation of the patients in the former method and its concurrent involvement of concentration, cognition, balance and respiration during the exercises.

5.1. Conclusion

Practicing pelvic floor muscle exercises effectively reduces urinary incontinence and its resulting stress, anxiety and depression in patients with MS.

Given that these exercises do not require a specific location and time and that they can be easily instructed and performed anytime, the results of the present study may encourage health service providers to consider the instruction of these exercises as an efficient method to provide more effective healthcare to patients with MS. It is further recommended to instruct patients on these exercises to adopt them as an appropriate therapeutic strategy in hospitals and MS associations and clinics across Iran.

5.2. Strengths and Limitations

The failure to use urodynamic tests and collect data using self-report checklists were among the limitations of this study. Moreover, it was impossible to use a control group due to the low number of patients. Future studies are recommended to include a control group and perform intergroup comparisons.

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Footnotes

Authors' Contribution: Forough Rafii, Moosa Sajjadi, Habib Shareinia, Payam Sarraf and Mahnaz Seyedalshohadaee: study design, data collection and writing the manuscript; Habib Shareinia: data analysis. All of them have given final approval of the version submitted for publication.

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