Original Article

Evaluation of the effect of biofeedback in women with urinary and fecal incontinence referring to the hospitals of Islamic Azad university of medical sciences, Tehran branch, Iran (2021)

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Abstract

Background and Purpose: Urinary incontinence (URIN) and fecal incontinence (FEIN) are common in women, which affect various aspects of their daily life and general health. Therefore, the main purpose of this study was to evaluate the effect of biofeedback (BFB) in women with urinary and FEIN referring to the hospitals of Islamic Azad University of Medical Sciences, Tehran branch, Iran (2021). **Materials and Methods:** This research was a cohort study that was conducted on 100 women with urinary and FEIN who were referred to selected hospitals of the Islamic Azad University of Medical Sciences, Tehran branch. In this study, before and after BFB, the amount of urinary and FEIN in patients was measured and finally compared by SPSS-ver. 16 software. **Results:** The results of this study showed that the frequency of patients with URIN and FEIN was equal to 66 (66%) and 34 (66%) patients, respectively. After treatment with BFB, 39 (59.1%) patients with URIN and 39 (59.1%) patients with FEIN had symptom improvement. The mean body mass index and the number of pregnancies in patients who improved urinary and FEIN symptoms after BFB were significantly lower than in patients who did not improve symptoms. **Conclusion:** Based on the findings of the present study, it can be concluded that effective and significant factors on the improvement of urinary and FEIN symptoms after BFB include fiber consumption, the presence of underlying diseases such as diabetes, blood pressure, type of delivery, history of depression, history of anorectal surgery, and vaginal delivery was difficult. In addition, based on the findings of the study, it can be said that BFB has an acceptable effect in improving the symptoms of urinary and FEIN in women, although additional studies are needed to confirm the results.

Keywords: Biofeedback, fecal incontinence, urinary incontinence, women

Background

Urinary and FEIN is one of the common complaints of women, which has an unpleasant effect on their life. Because it affects all their personal and social activities. It has been reported that three of every 11 women aged 30 to 59 years of experience URIN and one FEIN within 3-6 months after giving birth.[1,2] It is estimated that more than 11 million American adult women have urinary incontinence (URIN), which costs them $11 billion annually.[3] In general, 2.2% to 15.5% of society, especially women, have FEIN,[4] and the main risk factors for this type of incontinence are not known. In some studies, the number of births was mentioned as a risk factor for FEIN,[5] while in other studies, the number of

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births was not related to FEIN.[6-9] In the study by MacArthur *et al.* (2011), observed a relationship between urinary and FEIN with delivery method, so that the rate of urinary and FEIN in the group that gave birth by cesarean section was not significantly different from the natural delivery group.[10] While Melville *et al.* (2005) reported that vaginal delivery increases FEIN.[11]

Urination occurs when the pressure inside the bladder is higher than the pressure caused by the smooth and striated muscles of the urethra. URIN can be caused by daily habits, medical complications, or physical problems. A complete evaluation by the doctor can help the patient to diagnose what is behind this incontinence.[12] Factors such as difficult pregnancies and successive deliveries cause muscle weakness, decreased bladder control, and as a result, URIN.[13]

In addition, neurological disorders, the incorrect transmission of information, and wrong signals between the human brain and the bladder are one of the causes of natural bladder dysfunction. Diseases such as diabetes, Parkinson's disease, heart and stroke, taking certain drugs, drinking alcohol, bladder infections, and weight gain are the most important causes of URIN.[14-16]

Biofeedback (BFB) is a complementary medicine that is transmitted to the patient by visual and auditory messages and helps to improve muscle function, coordination of abdominal muscles, puborectalis, and anal sphincter in three ways.[17] BFB is an effective treatment for people who suffer from FEIN. The basic principles of BFB include re-educating the patient and supporting them to overcome problems such as bowel and FEIN. In cases where the weakness of the anal sphincter muscle is not complete, BFB is effective for controlling FEIN, but if the said muscle is not complete, this treatment method will not be effective.[18]

BFB in the treatment of URIN helps the patient to learn to control and strengthen the pelvic muscles that play an important role in bladder control. This treatment can help people who have stress URIN. In these people, the muscles cannot resist the pressure of actions such as coughing, sneezing, laughing, and lifting objects, and as a result, they cause the bladder to empty.[19]

Since this disease affects the quality of life of sufferers from different aspects, including their physical and social activities, and disrupts their mental health and general health. Sexual dysfunction, isolationism, avoiding physical activities, avoiding being in society, reducing social relationships, and reducing self-confidence are among them. Therefore, the present study was designed with the aim of evaluating the effect of BFB in women with fecal incontinence (FEIN) referred to the hospitals of Tehran Islamic Azad University of Medical Sciences, Tehran, Iran.

Materials and Methods

Study design

This research was a cohort study that was conducted on 100 women with urinary and FEIN who were referred to selected hospitals of Islamic Azad University, Tehran branch, Iran. All steps of this research were done with the approval of the ethics committee of the university and consent was obtained from all the participants in the study. For eligible patients who wanted to participate in this study, a checklist was designed and the required demographic information was collected by this checklist. In addition, information about urinary and FEIN was collected by the Wexner Score[20] and Questionnaire for female Urinary Incontinence Diagnosis.[21] All participants in the study were visited by a specialist doctor to confirm the disease. In this study, the amount of urinary and FEIN in patients was measured before and after BFB.

Entry and exit criteria

The criteria for inclusion in the study were included: (1) presence of urinary and FEIN, (2) age more than 18 years, (3) patients' ability to read and write, (4) written and informed consent to enter the study, (5) absence of neurological diseases, (6) not being in the acute or inflammatory stage of intestinal disease, (7) not having vision and hearing problems, and (8) not using other methods for treatment.

While the exclusion criteria included (1) patients with urinary infections, (2) history of medical and surgical treatments, (3) providing incomplete answers in the questionnaire, (4) unwillingness to continue cooperation at any point in time, (5) death of patient, (6) had underlying diseases that would cause problems in the process of performing BFB, and (7) doing sports at home.

Data collection tools

- Demographic checklist: This checklist included several questions such as height, age, weight, body mass index (BMI), fiber consumption (fruits/vegetables), marital status, employment status, education level, and duration of incontinence. Previous or current history of urinary infections, having risk factors, cause of incontinence, previous or current history of hormonal treatments, smoking, consumption of caffeinated beverages (tea and coffee), previous or current history of depression, history of previous anorectal surgery, history of removed rectum, history of difficult vaginal delivery, history of using wide episiotomy, and menopause conditions.
- Wexner score fecal incontinence questionnaire: This questionnaire was prepared by Wexner and Cohen (1995).[20] Validity and reliability of the Persian version of this questionnaire by Majidirad *et al.* (2021) determined that the results of the aforementioned study showed that the Persian version has acceptable content validity for Iranian patients. In addition, structural and concurrent validity measures had a moderate correlation. Also, internal consistency and intrarater reliability were moderate (0.51) and excellent ($rP = 0.97$) ($P < .001$).[22] This questionnaire consists of five questions. Questions were about stool output, sanitary pad use, and quality of life. Questionnaire scoring from 0

to 4 for each question was interpreted as follows. It was like that [zero = never happens], [(number 1) = (rarely happens) = (less than once a month)], [(number 2) = (sometimes happens) = (less than once a week to more than once a month)], [(number 3) = (usually happens) = (less than once a day to more than once a week)], and [(number 4) = (always happens) = (more than once a day)]. Finally, the scores of the questions were added together and a score of zero means no incontinence and a score of 20 means complete incontinence.

- The Questionnaire for Female Urinary Incontinence Diagnosis: This questionnaire was developed by Bradley *et al.* (2020).[21] Validity and reliability of its Persian version by Mokhlesi *et al.* (2017); it was evaluated that based on the results of the mentioned study, its content validity was acceptable and its reliability was at an appropriate level (Cronbach's alpha coefficient equal to 0.90 and its intracluster correlation coefficient equal to 0.86).[23]

Statistical analysis

The analysis of the collected data was done by using SPSS software version 26 and by descriptive tests and analysis. The Chi-squared test was also used to analyze qualitative data. The distribution of quantitative data was evaluated by the Kolmogorov-Smirnov test and based on the results of this test, a parametric test (independent *t*-test) or nonparametric test (Mann-Whitney U test) was used. All tests were used at a significant level ($\alpha = 0.05$).

Results

The results of this study showed that the frequency of patients with URIN and FEIN was equal to 66 (66%) and 34 (66%) patients, respectively. The score of the URIN questionnaire before and after administrative incontinence was 16.73 ± 6.06 and 11.97 ± 6.47, respectively, while the values for FEIN were 14.53 ± 2.25 and 9.47 ± 4.15, respectively. After performing BFB, 39 (59.1%) patients with URIN and 26 (76.5%) patients with FEIN had symptom improvement [Table 1]. Other demographic information related to the evaluated patients was presented in Table 1.

The correlation URIN with some variables including BMI ($P = .01$), number of deliveries ($P = .01$), fiber intake ($P = .048$), history of underlying disease (.009), type of delivery ($P = .02$), history of depression ($P = .038$), history of anorectal surgery ($P < .001$), and history of difficult vaginal delivery ($P = .037$) was significant. Other variables did not have a significant relationship with URIN ($P > .05$) [Table 1].

The correlation FEIN with some variables including BMI ($P = .031$), number of deliveries ($P = .047$), fiber intake ($P = .005$), history of underlying disease ($P = .007$), type of delivery ($P = .025$), history of depression ($P = .015$), history of anorectal surgery ($P = .001$), history of difficult vaginal delivery ($P < .001$), and history of the removed rectum ($P = .001$) was significant. Other variables did not have a significant relationship with FEIN ($P > .05$) [Table 2].

Table 1: The demographic information of evaluated patients

Variables		Amount
Age (year)		48.05±8.66
BMI		26.44±3.58
Number of pregnancies		2.2±1.2
Duration of URIN (Year)	Urine	1.17±0.04
	Feces	1.18±0.06
Marital status (Percent/Person)	Married	76 (76%)
	Single	24 (24%)
History of urinary infection (Percent/Person)	Positive	100 (100%)
	Negative	0 (0%)
Level of education (Percent/Person)	High school	55 (55%)
	Diploma	30 (30%)
	University education	15 (15%)
Employment status (Percent/Person)	Unemployed	64 (64%)
	Employed	36 (36%)
Fiber intake (Percent/Person)	High	15 (15%)
	Low	85 (85%)
History of underlying disease (Percent/Person)	Positive	26 (26%)
	Negative	74 (74%)
Type of delivery	Natural	85 (85%)
	Cesarean	15 (15%)
History of hormone therapy	Positive	0 (0%)
	Negative	100 (100%)
Smoking	Positive	29 (29%)
	Negative	71 (71%)
Consumption of caffeinated beverages	Positive	100 (100%)
	Negative	0 (0%)
History of depression	Positive	58 (58%)
	Negative	42 (42%)
History of anorectal surgery	Positive	18 (18%)
	Negative	82 (82%)
History of radiation to the pelvis	Positive	29 (29%)
	Negative	71 (71%)
History of removed rectum	Positive	2 (2%)
	Negative	98 (98%)
History of difficult vaginal delivery	Positive	29 (39%)
	Negative	71 (71%)
Menopause	Positive	29 (39%)
	Negative	71 (71%)

Discussion

URIN and FEIN are common in women, which affect various aspects of their daily life and general health. Therefore, the main purpose of this study was to evaluate the effect of BFB in women with urinary and FEIN referring to the hospitals of Islamic Azad University of Medical Sciences, Tehran branch, Iran (2021). The results of this study showed that the frequency of patients with URIN and FEIN was equal to 66 (66%) and 34 (66%) patients, respectively. After treatment with BFB, 39 (59.1%) patients with URIN and 39 (59.1%) patients with FEIN had symptom improvement. The average age and duration of incontinence in patients who improved after BFB were lower than those who did not improve, but this difference was not significant. In addition, the average age and duration of incontinence in patients who had improvement in FEIN symptoms after BFB

Table 2: Correlation of different variables with urinary incontinence

Variables		Effect of BFB on improvement status		*P*
		Improved	Unimproved	
Age (year)		46.48±1.70	46.36±1.40	0.92
BMI		25.15±0.5	27.60±0.75	0.01
Number of deliveries		2.54±0.1	3.37±0.1	0.01
Duration of URIN (Year)		1.13±0.5	1.22±0.8	0.069
Marital status (Percent/Person)	Married	37 (94.8%)	27 (100%)	0.23
	Single	2 (5.2%)	0 (0%)	
Level of education (Percent/Person)	High school	22 (56.4%)	16 (59.2%)	0.96
	Diploma	12 (30.7%)	8 (29.6%)	
	University education	5 (12.9%)	3 (11.2%)	
Employment status (Percent/Person)	Unemployed	34 (87.1%)	23 (85.1%)	0.81
	Employed	5 (12.2%)	4 (14.9%)	
Fiber intake (Percent/Person)	High	8 (20.6%)	1 (3.8%)	0.048
	Low	31 (79.4%)	26 (96.2%)	
History of underlying disease (Percent/Person)	Positive	6 (15.4%)	12 (44.5%)	0.009
	Negative	33 (84.6%)	15 (55.5%)	
Type of delivery (Percent/Person)	Natural	32 (82%)	27 (100%)	0.02
	Cesarean	7 (18%)	0 (0%)	
Smoking (Percent/Person)	Positive	13 (33.4%)	13 (48.2%)	0.22
	Negative	26 (66.6%)	14 (51.8%)	
History of depression (Percent/Person)	Positive	26 (66.6%)	24 (88.8%)	0.038
	Negative	13 (32.4%)	3 (11.2%)	
History of anorectal surgery (Percent/Person)	Positive	1 (2.6%)	10 (37.1%)	<0.001
	Negative	38 (97.4%)	17 (62.9%)	
History of radiation to the pelvis (Percent/Person)	Positive	15 (38.4%)	14 (51.8%)	0.28
	Negative	24 (61.6%)	13 (48.2%)	
History of difficult vaginal delivery (Percent/Person)	Positive	13 (33.4%)	16 (59.2%)	0.037
	Negative	26 (66.6%)	11 (40.8%)	
Menopause (Percent/Person)	Positive	5 (12.9%)	5 (18.6%)	0.52
	Negative	34 (87.1%)	22 (81.4%)	

was higher than in patients who did not improve symptoms, but this difference was not significant. The mean BMI and number of pregnancies in patients who improved urinary and FEIN symptoms after BFB were significantly lower than patients who did not improve symptoms. The variables that were significantly effective in the improvement of URIN and FEIN symptoms after BFB included the amount of fiber intake, history of underlying disease (such as diabetes, hypertension, etc.), type of delivery, history of depression, history of anorectal surgery, and vaginal delivery [Table 3].

The results of some studies done in the past were consistent with the present study. Zaferani and Sadati (2017) reported that about 45% of patients consumed fiber once a week and 38% of patients at least twice a week. Half of the patients did not exercise enough, and no statistically significant relationship was found between fluid intake, fiber, exercise, and gender with URIN and FEIN. In addition, based on the results of that study, muscle strength of sphincters increased significantly after BFB.[24] The study of Rafeipour *et al.* (2015)[25] was conducted on 45 female patients with URIN, and the results showed that BFB treatment was significantly effective in reducing URIN. In the present study, it was found that after BFB, 59.1% of patients with urinary incontinence and 76.5% of patients with FEIN improved. Goodarzi *et al.* (2021)[26] suggested that performing Kegel exercises was effective in reducing URIN and pain and increasing the strength of pelvic floor muscles in women with URIN. Therefore, this type of exercise was suggested as an effective and appropriate method to control URIN.[25]

Based on the results of similar studies in the past and the results of the present study, it can be said that the BFB treatment method has a significant effect in improving urinary and FEIN symptoms in women, although additional studies are needed to confirm the results of the present study. The limitations of the present study included[1] the small sample size,[2] the large number of questions in the questionnaires, which can lead to an increase in the time of the study, and this also reduces the accuracy of the participants' answers, and failure to evaluate some influential variables such as fluid consumption, exercise, etc.

Conclusion

Based on the findings of the present study, it can be concluded that effective and significant factors in the improvement of urinary and FEIN symptoms after BFB include fiber consumption, the presence of underlying diseases such as diabetes, blood pressure, type of delivery, history of depression, history of anorectal

Table 3: Correlation of different variables with fecal incontinence

Variables		Effect of BFB on improvement status		*P*
		Improved	Unimproved	
Age (year)		52.15±1.3	48.25±2.3	0.14
BMI		25.8±1	27.9±0.5	0.031
Number of deliveries		1.29±0.1	2.45±0.3	0.047
Duration of URIN (Year)		1.23±0.8	1.11±0.2	0.071
Marital status (Percent/Person)	Married	22 (84.6%)	7 (87.5%)	0.84
	Single	4 (15.4%)	1 (12.5%)	
Level of education (Percent/Person)	High school	12 (46.1%)	5 (62.5%)	0.48
	Diploma	9 (34.6%)	1 (12.5%)	
	University education	5 (19.3%)	2 (25%)	
Employment status (Percent/Person)	Unemployed	23 (88.4%)	7 (87.5%)	0.94
	Employed	3 (11.6%)	1 (12.5%)	
Fiber intake (Percent/Person)	High	18 (69.2%)	1 (12.5%)	0.005
	Low	8 (30.8%)	7 (87.5%)	
History of underlying disease (Percent/Person)	Positive	6 (23.1%)	6 (75%)	0.007
	Negative	20 (76.9%)	2 (25%)	
Type of delivery (Percent/Person)	Natural	11 (42.4%)	7 (87.5)	0.025
	Cesarean	15 (57.6%)	1 (12.5%)	
Smoking (Percent/Person)	Positive	4 (15.4%)	3 (37.5%)	0.17
	Negative	22 (84.6%)	5 (62.5%)	
History of depression (Percent/Person)	Positive	10 (38.5%)	7 (87.5%)	0.015
	Negative	16 (61.5%)	1 (12.5%)	
History of anorectal surgery (Percent/Person)	Positive	0 (0%)	3 (37.5%)	0.001
	Negative	26 (100%)	5 (62.5%)	
History of radiation to the pelvis (Percent/Person)	Positive	5 (19.3%)	3 (37.5%)	0.36
	Negative	21 (80.7%)	5 (62.5%)	
History of difficult vaginal delivery (Percent/Person)	Positive	2 (7.7%)	6 (75%)	<0.001
	Negative	24 (92.3%)	2 (25%)	
Menopause (Percent/Person)	Positive	5 (19.3%)	2 (25%)	0.72
	Negative	21 (80.7%)	6 (75%)	
History of removed rectum	Positive	0 (0%)	3 (37.5%)	0.001
	Negative	26 (100%)	5 (62.5%)	

surgery, and vaginal delivery was difficult. In addition, based on the findings of the study, it can be said that BFB has an acceptable effect in improving the symptoms of urinary and FEIN in women, although additional studies are needed to confirm the results. The results of this study can be useful for the future plans of ministries of health, medical centers, and universities of medical sciences to determine the causes of urinary and FEIN in Iranian women. It is suggested to conduct more studies with a larger sample size in the future. In addition, it is suggested that similar studies be conducted to investigate the prevalence and causes of urinary and FEIN in different provinces of Iran.

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Conflicts of interest

There are no conflicts of interest.

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