Effect of Core Stability Exercises and Pelvic Muscle Exerciser Appartus on Pelvic Floor Muscle Strength, Quality of Life and Sexual Satisfaction in Women with Urinary Incontinence and Uterine Prolapse

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Abstract

Introduction: Nowadays, urinary incontinence is a common problem among women. Kegel and core stability exercises might be effective in the treatment of urinary incontinence and its complications. The present study aimed to investigate the effect of core stability exercises and pelvic muscle exerciser on pelvic floor muscle strength, quality of life, and sexual satisfaction in women with urinary incontinence and uterine prolapse. **Materials and Methods:** This experimental study was conducted using a pretest-posttest design. The paticipants were30 women with the urinary incontinence who were selected using purposeful sampling and were randomly divided into experimental and control groups. In the pretest and posttest, participants filled out the Larson's Sexual Satisfaction Questionnaire (LSSQ) and Incontinence Quality of Life Scale (IQOL), their pelvic muscle strength was measured using a pelvic biofeedback device, and intensity of urinary incontinence by a Visual Analogue Scale (VAS). Experimental group performed the core stability exercises for eight weeks (three sessions of 30 min per week) and used Pelvic Muscle Exerciser XFT-200. Control group continued their routine daily activities. **Results:** Ten people from each group completed the follow-up and were analyzed. Findings suggested that core stability exercises and using pelvic muscle exerciser had a significant effect on the avoidance of severe urinary incontinence ($P<0.01$), pelvic floor muscle contraction strength ($P<0.01$), quality of life ($P<0.01$), sexual compatibility ($P<0.01$) and quality of sexual life ($P<0.01$) and have there was no significant effect on the desire to have sex ($P>0.05$) and sexual attitude ($P>0.05$). **Conclusion:** It appears that core stability exercises in women with urinary incontinence could strengthen pelvic floor muscles and improve uterine prolapse in these people. In addition, handling the symptoms of urinary incontinence may improve the variables of quality of life in women with uterine prolapse and urinary incontinence.

Keywords: Core Stability Exercises; Quality of Life; Sexual Satisfaction; Urinary Incontinence

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Introduction

Childbirth is a significant event in women's life. Although it is a natural physiological event, this constructive process might accompany potentially destructive complications which put a women's body at risk. One of the most common and inevitable complications of pregnancy and labor is their effect on the structure of pelvic floor muscles and urinary incontinence (1). Urinary incontinence is the involuntary leakage of urine which is common among women. It is a common complaint among this population with a huge impact on their quality of life. Urinary incontinence may affect most aspects of people's lives and causes significant psychological damage. It is mostly observed in older women and mainly caused by multiple pregnancies and vaginal birth (2). Pelvic organ prolapse (POP) is defined as one or more of the organs in the pelvis slip down from their normal position. In fact, it refers to the displacement of the bladder, uterus, or rectum. It is a common complication which progressively affects a high percentage of older women. A prolapse is associated with limited morbidity, but it can result in significant complications in patients with POP (3, 4). Impaired functioning of the pelvic floor muscles may impose significant adverse effects on women's quality of life; for instance, it causes urinary incontinence, fecal incontinence, pelvic organ prolapse, sexual dysfunction, pelvic girdle pain, and chronic pain syndrome (5).

In recent years, the role of waist and pelvis as the torso of the body has received increasing attention in pathology and treatment of sports injuries, since they control the movement of torso and limbs. The torso extends from the chest to the pelvic floor and includes lumbar, pelvic, and hip joints. The torso harbors many of the main groups of muscles in the body, including the pectoral, abdominal, gluteal, and pelvic floor muscles (6). On the other word, the torso is like a cylinder where abdominal muscles are in front of it, the extensor muscles of vertebrae and gluteal muscles are on the back, the diaphragm is on top, and the pelvic girdle muscles and pelvic floor are in the bottom. Torso muscles play a vital role in producing, increasing or decreasing strength and in stabilizing the spine and trunk (7).

Borello-France *et al.* conducted a study on the effect of exercise position to reduce the symptoms of stress urinary incontinence (SUI) and increase the quality of life of two groups of women with SUI. It was reported that doing exercises while lying down and standing decreased the prevalence of urinary incontinence by 68% and the type of exercise position had no effect on the results of the study (8). Ptak *et al.* conducted a study on 137 women with the urinary incontinence and reported that pelvic floor exercises helped relieve urinary incontinence (9). In another study by Sar and Khorshid on the effect of the pelvic floor exercises on stress urinary incontinence and mixed incontinence, it was shown that eight weeks of pelvic floor exercises significantly improved pelvic floor muscles strength and dimensions of quality of life and also reduced the frequency of urinary incontinence (10, 11).

Currently, low-cost, non-invasive and non-pharmaceutical methods such as core stability and Kegel exercises are used along with various pelvic floor biofeedback devices for the treatment of urinary incontinence and its complications (11). However, few studies have been conducted on the simultaneous effect of core stability exercises and pelvic muscle exerciser to control urinary incontinence and to improve quality of life and sexual satisfaction in patients with urinary incontinence and uterine prolapse. Complex treatments such as laser therapy and chemotherapy, as well as alpha-agonists are prescribed to treat the disease which enhance sphincter function (12). In the most studies conducted, the strength of pelvic floor muscles was measured using manual methods with lack of sufficient accuracy. In order to solve the problem, pelvic muscle exerciser was utilized in the present study along with core stability exercises to accurately measure pelvic floor muscles in order to help patients to contract pelvic floor muscles more accurately. Given the limited number of studies and contradictory findings, it seems essential to further investigate the effect of core stability exercises and pelvic muscle exerciser as low-cost, non-invasive and available methods. Therefore, the present study aimed to evaluate the effect of core stability exercises and pelvic muscle exerciser on pelvic floor muscle strength, quality of life, and sexual satisfaction in women with urinary incontinence and uterine prolapse.

Materials and Methods

Participants

This was an experimental study using pretest-posttest design. The paticipants were women with urinary incontinence and uterine prolapse between 25 and 50 years of age and a BMI between 20 and 30 kg/m2. After informing the medical centers, fifty eligible patients who met inclusion criteria were selected by urologists or gynecologists. The author informed the participants on objectives and research method. Thirty Participants filled the consent form out to participate in the study. After participating in the pre-test, then they were randomly divided into experimental and control groups, and only 20 patients participated in final tests. Inclusion criteria were stress or mixed urinary incontinence, uterine prolapse, absence of menopause, and having a full test of normal urine culture. Exclusion criteria were pregnancy, taking any medications or surgery for urinary incontinence, vulvovaginitis, systemic diseases, taking medications such as chronic degenerative and neuromuscular diseases, progressive genital prolapse, cardiac pacemaker, cardiopulmonary diseases, and other types of urinary incontinence. The present study was approved by Ethics Committee of University of East Tehran Branch with the code of ethics: IR.IAUETB.491374. The flowchart concert of the present study is presented in Figure 1.

The sample size was 15 people for each group calculated with G Power software with considering the 95 %confidence level,80 % power, and medium effective size (13). However, According to the exclusion criteria such as regular participation in training sessions for the experimental group and non-participation in any exercises for the control and experimental groups, 6 people from each group were withdrawn from study.

Procedure

Prior to study, all participants filled out the Incontinence Quality of Life Scale (IQOL) and Larson's Sexual Satisfaction Questionnaire (LSSQ), and their intensity of urinary incontinence was measured using a Visual Analogue Scale (VAS). Their pelvic floor strength was measured by an urologist using a Pelvic Muscle Exerciser XFT-200.

After recording the information and scores of the questionnaires, and holding a 2-day familiarization course with

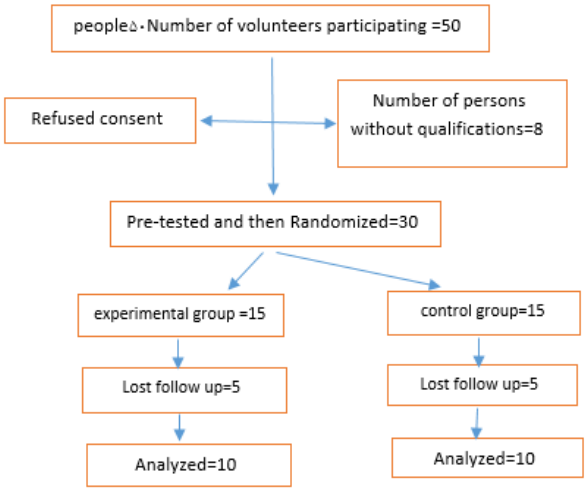

Figure 1. Flowchart concert

core stability exercises, the participants received 8 weeks of core stability exercises (3 sessions of 30 min per week) and used pelvic muscle exerciser XFT-200 at a female gym. Before starting the exercises in each session, participants performed warming up and stretching for 15 minutes. Then, the core stability exercise protocol was performed by an experienced practitioner. The control group did not receive any interventions and continued their routine daily activities. At the end of the course, the participants of two groups refilled out the IQOL and LSSQ scales, their pelvic floor muscles strength was evaluated, and the results were recorded. Finally, pretest and posttest scores of the questionnaires and pelvic floor muscle strength were compared.

Instruments

The intensity of urinary incontinence was measured using VAS scale and the participants scored their incontinence in a range between 0 and 10 where 1 indicates absence of urinary incontinence and 10 indicates the worst state of the disease.

Pelvic floor muscle strength contraction was measured using a pelvic muscle examiner (Figure 2). It is designed and manufactured by XFT Co. Given the use of a pneumatic probe, it is the safest and most efficient biofeedback device to treat urinary incontinence (14). Pelvic floor muscle strength contraction was measured in Newton (N) using the probe. Higher values indicate stronger pelvic floor muscles. The exercises proposed by the device were utilized according to the results from the assessment to improve pelvic floor muscle strength.

Sexual compatibility, Quality of sexual life, Sexual attitude, and desire to have sex were measured using the LSSQ (15-17). The LSSQ consists of 25 items which generally assess sexual satisfaction. The questions were scored on a 5-point Likert scale from 1 to 5 where 1=never, 2=rarely, 3=sometimes, 4=often, and

Figure 2. Pelvic biofeedback device

5=always. The scores are between 25 and 125. Sexual satisfaction is ranked from lack of sexual satisfaction (score less than 50), low satisfaction (50-75), somewhat satisfied, (75-100), and high satisfaction (scores greater than 101). Items (4, 5, 6, 7, 8, 9, 11, 14, 15, 18, 20, 24, 25) are scored inversely while other items are scored positively. Increasing the obtained score in each subtest after the intervention show improvement.

Avoidance and limiting behavior, psychosocial impacts, and Social embarrassment were measured using the IQOL. The IQOL questionnaire is one of the well-validated and reproducible questionnaires that qualitatively assesses urinary incontinence from the patient's point of view. It consists of 22 items on the quality of life related to urinary incontinence. Each item is scored on a 5-point Likert scale from 1 to 5 where 5 indicates the absence of complication and 1 is the severe complication. The higher the score of the questionnaire, the better the patients' conditions. Scores of the questionnaire include a general score called IQOL and three subgroups as follows (18). The avoidance and limiting behavior (ALB) subscale measured using items 1, 2, 3, 4, 10, 11, 13, 20 indicates those behaviors which are limited or avoided due to urinary incontinence, such as fear of sneezing and coughing, fear of finding a toilet in unfamiliar places, controlling fluid intake, sleep disturbance at night, etc. Psychosocial impacts (PI) subscale measured by items 5, 6, 7, 9, 15, 16, 17, 21, 22 deals with psychological problems due to urinary incontinence such as despair, depression, and helplessness. Social embarrassment (SE) subscale measured by items 8, 12, 14, 18 and 19, considers feelings such as shame and humiliation in the community due to the complications of urinary incontinence. The following relation was used to score each subscale (19, 20). Increasing the obtained score in avoidance and limiting behavior, psychosocial impacts subtest after the intervention presents improvement, but decreasing the obtained score in social embarrassment subtest after the intervention presents improvement.

Scale score=(the sum of the items–lowest possible score)/possible row score range×100

Table 1. Mean (SD) of demographic characteristics of participants (n=20)

Variables	Control group	Experimental group	T	*P*-value
Age (year)	25.8 (2.61)	23.9 (2.76)	1.571	0.132
Weight (kg)	65.5 (7.79)	68.4 (6.09)	0.264	0.794
Height (cm)	159.3 (4.52)	158.7 (5.55)	0.926	0.366
BMI (kg/m^2)	25.81 (2.34)	27.15 (2.87)	1.106	0.282

Table 2. Mean (SD) of descriptive indices in pretest and posttest for experimental and control groups along with the results of ANCOVA (*P<0.01)

Variables	Experimental group		Control group		Results of ANCOVA		
	pretest	posttest	pretest	Posttest			
Intensity of urinary incontinence	8.3 (2.75)	6.3 (1.76)	7.7 (3.28)	7.1 (2.98)	70.83	0.001*	0.88
Pelvic floor muscles contraction (Newton)	10.6 (1.5)	16.9 (1.19)	11.9 (2.99)	11.9 (2.28)	182.15	0.001*	0.92
Sexual compatibility	14.5 (2.22)	17.7 (1.49)	14.3 (2.01)	14.2 (1.87)	56.66	0.001*	0.83
Quality of sexual life	16.9 (1.72)	20.9 (1.1)	17.2 (2.39)	17.3 (1.94)	120.16	0.001*	0.89
Sexual attitude	11.5 (2.06)	11.6 (2.06)	11.9 (2.33)	12.2 (2.09)	0.76	0.39	0.043
Desire to have sex	22.7 (1.33)	22.8 (0.78)	22.8 (1.93)	22.8 (1.47)	0.06	0.79	0.004
Avoidance and limiting behavior	23.8 (2.14)	26.5 (1.08)	24.3 (1.76)	24.1 (2.02)	30.73	0.001*	0.70
Psychosocial impacts	12.7 (3.65)	12.8 (3.22)	12.7 (3.65)	12.8 (3.22)	57.66	0.001*	0.88
Social embarrassment	11.4 (1.26)	9 (1.05)	10.8 (1.61)	10.7 (1.63)	23.07	0.001*	0.63

Statistical analysis

SPSS 23 was utilized to analyze data. Shapiro-Wilk test was used to examine normal distribution of data. To check the equality of variance between groups, Levene's test was utilized. To test the homogeneity of the regression slope, F value was calculated from the interaction between the pretest data and independent variable using analysis of covariance. Also, to determine the difference between posttest scores of experimental and control groups, ANCOVA test was employed. The p-value less than 0.05 was considered significant.

Results

Mean and standard deviation of age, height, and weight of participants in experimental and control groups is indicated in Table 2. A comparison of demographic data between two groups using independent t-test showed no significant difference (P>0.05).

Analysis of data indicated that distribution of all pretest and posttest data was normal in experimental and control groups and also variance of pretest and posttest data was equal in both groups. In addition, the homogeneity of regression slope was also established. Given that the covariance test assumptions were established, the differences in pretest and posttest scores of experimental and control groups were compared. Descriptive indices in the pretest and posttest stages are reported in Table 2 for two groups along with the results of ANCOVA.

Results of Table 2 indicate that by eliminating the effect of pretest as a covariate variable, the effect of the core stability exercises and pelvic muscle exerciser on posttest scores was significant in experimental group. In other words, after adjusting the pretest scores, the core stability exercises and pelvic muscle exerciser had a significant effect (P = 0.001) in experimental group. The effect size of exercises was 0.88 in experimental group. Findings suggested that 8 weeks of core stability exercises and using pelvic muscle exerciser had a significant improvement on avoiding severe urinary incontinence, pelvic floor muscle contraction, components of avoidance and limiting behavior, psychosocial impacts, social embarrassment, quality of life, sexual compatibility, and quality of sexual life in experimental group. There was no significant effect on the desire to have sex and sexual attitude in the experimental group.

Discussion

Results of the study demonstrated that 8 weeks of core stability exercises and using pelvic muscle exerciser apparatus had a significant improvement on pelvic muscles contraction strength and intensity of urinary incontinence in women with urinary incontinence and uterine prolapse. It can be said 24 sessions of therapeutic exercises for pelvic floor muscles and core muscles in the supine, sitting, and standing positions

significantly can improve static and dynamic strength of pelvic floor muscles. The findings of the present study comply with the results of studies by Farzinmehr *et al.* and Ptak *et al.* (9, 18). One of the common causes of stress urinary incontinence is weakening pelvic floor muscles. Appropriate exercises to strengthen pelvic floor muscles can improve or treat stress urinary incontinence in women. Axial trunk muscles and lumbo-pelvic hip complex perform patterns of movement which play a significant role in stabilizing the trunk and maintaining various body postures, both in static and dynamic positions. All muscles of the trunk should be activated simultaneously in routine dynamic and static activities to maintain the stability of the trunk. Doing core exercises increases the strength and endurance of the perineal muscles through neuromuscular adaptation mechanisms and improves coordination of pelvic floor muscle fibers as well as simultaneous activation of the motor unit in these muscles which have a significant effect on improving urinary incontinence (21).

The findings also indicated that core stability exercises and pelvic muscle exerciser had a significant positive effect on sexual attitude and desire to have sex in women with urinary incontinence; however, there was no significant effect on their sexual compatibility and quality of sexual life. In justifying these findings, it can be said that pelvic floor muscle contraction plays an important role in the female orgasmic response. Furthermore, the strength of pelvic floor muscles probably affects the anatomical position of clitoral erectile tissue with consequences to sexual stimulation (23).In addition to changing muscle morphology by increasing cross-sectional diameter, muscle training increases neuromuscular function by increasing active motor neurons and the frequency of motor neuron stimulation, thus improving pelvic floor muscle contraction that participates in sexual arousal(24). Women may be able to reach orgasm more easily after a pelvic floor exercise program. Exercise improves muscle tone and circulation, and this is particularly important for the smaller muscles of the pelvic floor, which are responsible for engorging the clitoris when women are aroused. This may explain why the improvement is considered in the physical aspect of sexual function as opposed to other aspects (25).

Based on the results, the core stability exercises and pelvic muscle exerciser had a significant positive effect on avoidance and limiting behavior, psychosocial effects, and social embarrassment in women with urinary incontinence. These findings are in line with the findings obtained by Liebergall *et al.* who investigated the effect of two exercises on women's quality of life of with the urinary incontinence and the findings obtained by Jalali Nia *et al.* who demonstrated the positive effect of strengthening exercises of pelvic floor muscles in patients who underwent the prostate surgery (26, 27). In most previous studies (8, 9, 26, 27), the effect of exercising on urinary incontinence was investigated and it was shown that core stability exercises and pelvic floor muscle strength helped improve urinary incontinence. Stress urinary incontinence is an outcome of uterine prolapse. So, improved symptoms of uterine incontinence could contribute to improve the uterine prolapse. Pelvic muscles protect the uterine, bladder, and bowels and also supports them against gravity. Weakened pelvic floor muscles may contribute to pelvic organ prolapse (uterine, bladder, and colon prolapse). Vaginal delivery destructs the structure and function of the pelvic floor muscles (28).

Some the limitations of the present study were low number of subjects and withdrawal of a large number of subjects from research during the test or training sessions. In this study, due to the small number of groups, we could not compare the effects of Core Stability Exercises and pelvic muscle exerciser apparatus. It is suggested that effect of these two methods on Sexual Satisfaction and Sexual function is compared in future research.

Conclusion

It appears that using core stability exercises along with pelvic muscle examiner in women with urinary incontinence could strengthen the pelvic floor muscles and reduce the severity of urinary incontinence. In addition, improved symptoms of urinary incontinence may improve the quality of life and sexual satisfaction in women with uterine prolapse and urinary incontinence. The first-line conservative treatment can be recommended for women with the urinary incontinence.

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Authors' contributions:
All authors made substantial contributions to the conception, design, analysis, and interpretation of data.

References

1. Dehghan Manshadi F, Amiri Y, Sedighimehr N, Akbarzadeh Baghban A, Rezasoltani A. Ultrasonic Thickness of Abdominal Wall Muscles in Non-Specific Chronic Low Back Pain Patients based on STarT Questionnaire. The Scientific Journal of Rehabilitation Medicine. 2019;8(2):10-7.
2. Kwon BE, Kim GY, Son YJ, Roh YS, You MA. Quality of life of women with urinary incontinence: a systematic literature review. International neurourology journal. 2010;14(3):133.
3. Boyles SH, Weber AM, Meyn L. Procedures for pelvic organ prolapse in the United States, 1979-1997. American journal of obstetrics and gynecology. 2003;188(1):108-15.
4. Moalli PA, Ivy SJ, Meyn LA, Zyczynski HM. Risk factors associated with pelvic floor disorders in women undergoing surgical repair. Obstetrics & Gynecology. 2003;101(5):869-74.
5. Lawson S, Sacks A. Pelvic floor physical therapy and women's health promotion. Journal of Midwifery & Women's Health. 2018;63(4):410-7.
6. Pascoal AG, Stuge B, Mota P, Hilde G, Bø K. Therapeutic Exercise Regarding Musculoskeletal Health of the Pregnant Exerciser and Athlete. Exercise and Sporting Activity During Pregnancy: Springer; 2019. p. 309-26.
7. Berek JS. Berek & Novak's gynecology: Lippincott Williams & Wilkins; 2019.
8. Borello-France DF, Zyczynski HM, Downey PA, Rause CR, Wister JA. Effect of pelvic-floor muscle exercise position on continence and quality-of-life outcomes in women with stress urinary incontinence. Physical therapy. 2006;86(7):974-86.
9. Ptak M, Ciećwież S, Brodowska A, Starczewski A, Nawrocka-Rutkowska J, Diaz-Mohedo E, et al. The effect of pelvic floor muscles exercise on quality of life in women with stress urinary incontinence and its relationship with vaginal deliveries: a randomized trial. BioMed research international. 2019;2019.
10. Sar D, Khorshid L. The effects of pelvic floor muscle training on stress and mixed urinary incontinence and quality of life. Journal of Wound Ostomy & Continence Nursing. 2009;36(4):429-35.
11. Hay-Smith J, Mørkved S, Fairbrother K, Herbison G. Pelvic floor muscle training for prevention and treatment of urinary and faecal incontinence in antenatal and postnatal women. Cochrane Database Syst Rev. 2009;1(1).
12. Kolber MJ, Beekhuizen K. Lumbar stabilization: An evidence-based approach for the athlete with low back pain. Strength & Conditioning Journal. 2015;37(4):85-93.
13. Cunningham JB, McCrum-Gardner E. Power, effect and sample size using GPower: practical issues for researchers and members of research ethics committees. Evidence-Based Midwifery. 2007;5(4):132-7.
14. Zhoukai P, Zhang P, Zhou H, Chen H, Kunyu X, Feng S. Effect of Vaginal Pressure Feedback Combined with Pelvic Floor Muscle Resistant Training on Stress Urinary In-continence. Chinese Journal of Rehabilitation Theory and Practice. 2016(2):194-7.
15. Bahrami N, Sharif Nia H, Soliemani MA, Haghdoost AA. Validity and reliability of the persian version of Larson sexual satisfaction questionnaire in couples. Journal of Kerman University of Medical Sciences. 2016;23(3):344-56.
16. Bahrami N, Yaghoobzadeh A, Sharif Nia H, Soliemani M, Haghdoost A. Psychometric properties of the Persian version of Larsons sexual satisfaction questionnaire in a sample of Iranian infertile couples. Iranian Journal of Epidemiology. 2016;12(2):18-31.
17. Saminfar S, Vaziri S. The Association of Sexual Dysfunction and Sexual Satisfaction with the Mediating Effect of Sexual Self-efficacy among Married Women in Tehran. SALAMAT IJTIMAI (Community Health). 2019;6(4):397-405.
18. Farzinmehr A, Moezzi A, Koohpayezadeh J. A Combination Training of Pelvic Floor Muscles and Core Muscles in Improvement of Stress Urinary Incontinence. Razi Journal of Medical Sciences. 2013;20(109).
19. Nojomi M, Baharvand P, Patrick DL. Incontinence quality of life questionnaire (I-QOL): translation and validation study of the Iranian version. International Urogynecology Journal. 2009;20(5):575-9.
20. Kashanian M, Shah Ali S, Nazemi M, Baha Sadri S. Evaluation of the Effect of Kegel Exercise and Kegel Master Device on the Urinary Incontinence in Women of Reproductive Age and a Comparison between them. Razi Journal of Medical Sciences. 2010;17(77):55-66.
21. Farzinmehr A, Moezy A, Koohpayehzadeh J, Kashanian M. A comparative study of whole body vibration training and pelvic floor muscle training on women's stress urinary incontinence: three-month follow-up. Journal of family & reproductive health. 2015;9(4):147.
22. Golmakani N, Zare Z, Khadem N, Shareh H, Shakeri MT. The effect of pelvic floor muscle exercises program on sexual self-efficacy in primiparous women after delivery. Iranian journal of nursing and midwifery research. 2015;20(3):347.
23. Zahariou AG, Karamouti MV, Papaioannou PD. Pelvic floor muscle training improves sexual function of women with stress urinary incontinence. International Urogynecology Journal. 2008;19(3):401-6.
24. Fatton B, de Tayrac R, Letouzey V, Huberlant S. Pelvic organ prolapse and sexual function. Nature Reviews Urology. 2020;17(7):373-90.
25. Jha S, Walters SJ, Bortolami O, Dixon S, Alshreef A. Impact of pelvic floor muscle training on sexual function of women with urinary incontinence and a comparison of electrical stimulation versus standard treatment (IPSU trial): a randomised controlled trial. Physiotherapy. 2018;104(1):91-7.
26. Liebergall-Wischnitzer M, Paltiel O, Celnikier DH, Lavy Y, Manor O, Wruble ACW. Sexual function and quality of life of women with stress urinary incontinence: a randomized controlled trial comparing the Paula method (circular muscle exercises) to pelvic floor muscle training (PFMT) exercises. The journal of sexual medicine. 2012;9(6):1613-23.
27. Jalalinia SF, Raei M, Naseri-Salahshour V, Varaei S. The Effect of Pelvic Floor Muscle Strengthening Exercise on Urinary Incontinence and Quality of Life in Patients after Prostatectomy: a Randomized Clinical Trial. Journal of Caring Sciences. 2020;9(1):33.
28. Faundes A, Guarisi T, Pinto-Neto A. The risk of urinary incontinence of parous women who delivered only by cesarean section. International journal of gynecology & obstetrics. 2001;72(1):41-6.