

ORIGINAL ARTICLE

The Effect of Yoga and Pelvic Floor Muscle Exercise on Sexual Function and Sexual Self-esteem of Reproductive-age Women: A Randomized Clinical Trial

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ABSTRACT

Background: Sexual function is a part of sexual health which is an important aspect of the quality of life. Physical activity is one of the healthiest activities that can effectively reduce the risk of sexual disorders. Therefore, this study was conducted with the aim of evaluating the effect of yoga and pelvic floor muscle exercises on the sexual function and sexual self-esteem of reproductive-age women.

Methods: This randomized clinical trial study was conducted from September to December 2023 on 46 women of reproductive age working in the Shahrekord University of Medical Sciences and its affiliated health centers. Multi-stage cluster sampling was used to select the subjects; later, they were randomly divided into two intervention groups A (N=21) and B (N=25). Participants in intervention groups A and B performed pelvic floor muscle exercises at home using an educational pamphlet 3 times a week for 6 weeks, with 3 times a day repetition. In addition, women in the intervention group A participated in a yoga training program for 2 sessions per week for 6 weeks. Data collection tools included a demographic information form, the Female Sexual Function Index, and Sexual Self-Esteem Inventory for women. Questionnaires were completed by both groups before, immediately, and one month after the intervention. The data were analyzed using the chi-square test, fisher's exact test, independent two-sample t-test, repeated measures test, and analysis of covariance in SPSS software version 16. A significance level of less than 0.05 was considered.

Results: The results showed no statistically significant difference between the two groups in sexual function (P=0.21) and sexual self-esteem (P=0.22) scores before the intervention. Also, the results showed no statistically significant difference between the two groups in terms of sexual function (P=0.35) and sexual self-esteem (P=0.59) scores one month after the intervention. However, the mean score of the sexual function index immediately after intervention showed a statistically significant difference between the intervention groups A (31.43±3.76) and B (29.41±2.38) (P<0.001). The mean score of the sexual self-esteem immediately after the intervention showed a statistically significant difference between the intervention groups A (181.19±19.90) and B (171.32±15.02) (P<0.001).

Conclusion: Adding yoga exercises to pelvic floor muscle exercises can improve the sexual function and sexual self-esteem of women at their reproductive age.

Trial Registration Number: IRCT20100524004015N1.

Keywords: Exercise, Pelvic floor, Self Esteem, Sexual Dysfunctions, Yoga

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INTRODUCTION

Sexual function is one of the important aspects of quality of life, which is associated with factors such as the absence of pain and discomfort during sexual intercourse, absence of physiological problems, healthy sexual response cycle (sexual desire, arousal, orgasm, and resolution), and the subjective feeling of satisfaction with sexual function and behavior.¹ In general, sexual function is considered a part of sexual health.² The World Health Organization considers sexual health as a type of harmony between the mind, emotion, and body, which can lead to the rational and social aspects of personality development.³

Sexual self-esteem is defined as one's self-view of a sexual being and includes the value that people place on their sexual identity. Sexual self-esteem consists of several components such as skill and experience (which refers to the ability to enjoy a sexual partner), attractiveness (which means believing in one's beauty), control (which refers to the ability to manage sexual thoughts and behavior), moral judgment (which means the ability to evaluate one's thoughts, feelings, and sexual behavior with own personal goals), and adaptability (which means the ability to adapt own sexual behavior and experiences with the personal goals of others).^{4,5} To enjoy a healthy sexual behavior, one must first be sure of the physical health and efficiency of his/her reproductive organs and feel satisfied with his/her sexual role.³ Women form the basic pillar of a family, and it is important to pay attention to their physical and mental health because of the direct effect it has on the health of the family and the upbringing of their children.⁶

Pelvic floor muscles in women play an important role in women's stimulation and orgasm so that the weakness of these muscles causes a decrease in the blood flow and insufficient vaginal lubrication, as well as dyspareunia, and anorgasmia.⁷⁻¹⁰ Since the weakness of pelvic floor muscles causes prolapse, painful intercourse or dyspareunia,

back pain, sexual dysfunction, and sexual dissatisfaction,¹¹ pelvic floor muscle strengthening exercises can strengthen the sexual organs, as well as urinary tract, bladder, and anus muscles. They can also increase the blood flow in the genital area and reduce the involuntary excretion of urine during sneezing.¹²

Yoga originated in India and includes a combination of movements related to spiritual, moral, and physical systems.¹³ Yoga is an activity whose purpose is to develop and maintain a proper balance between the body and mind.¹⁴ It consists of a number of regular stretching movements combined with breathing techniques and concentration, which lead to a healthy body and soul.¹⁵ Evidence shows that yoga has many advantages and can be used as a popular non-pharmacological alternative to treat various physical and mental problems.¹⁶ Continuous and regular yoga exercises can help to maintain the stability of the body by strengthening muscles, increasing the range of joints motion, and developing spine movement.¹⁷ Physical and breathing exercises in yoga increase flexibility and muscle strength, improve blood circulation and oxygen absorption, and enhance the function of the hormonal system.¹⁸ Several experimental studies have investigated the beneficial effect of yoga on various aspects of physical and mental performance, showing that yoga is effective in improving sexual dysfunction in women.^{19, 20} Since women have always been considered the main axis of familial and social health, growth and development and recognizing and preventing their physical and mental problems have always been the focus of the field of healthcare and community health. Therefore, the factors that cause physical and emotional problems in women should be known and ways should be identified to prevent them so that women's health can be improved. Improving sexual function and increasing sexual self-esteem in women, which is affected by the recognition of sexual problems, has received less attention in developing countries and it is considered

as a taboo. According to the evidence of the necessary and important role of exercise in the development of the quality of married life and the reduction of disturbing factors on physiological and sexual function, we decided to conduct a study for evaluation of the effect of yoga and pelvic floor muscle exercises on sexual function and sexual self-esteem of reproductive age women.

MATERIALS AND METHODS

This randomized clinical trial study was conducted from September to December 2023 on 46 married women of reproductive age working in the Shahrekord University of Medical Sciences, Shahrekord, Iran, and its affiliated health centers. After obtaining the necessary permits, sampling was done among eligible women by a multi-stage cluster method. In this way, each part of the university headquarters or faculties was considered a cluster. Then,

10 clusters were randomly selected, and from each cluster, 6 qualified subjects who met the inclusion criteria were included in the study using the convenience sampling method.

The sample size was determined according to the study of Shadani et al.; considering the $\alpha=0.05$, the power of 0.8, and the mean difference of 6 for the sexual function, 21 subjects in each group were required.²¹ The samples were divided into two intervention groups (A and B) using random allocation software and permuted block randomization using 10 blocks with a volume of 6. In each block, 3 women were in the intervention group A (pelvic floor muscles exercises and yoga) and 3 in the intervention group B (pelvic floor muscles exercises). Considering the attrition rate of 30%, 2 groups of 30 people were enrolled in the study. Finally, 9 individuals from the intervention group A and 5 individuals from intervention group B were lost to follow up, and analysis was done on 46 individuals (Figure 1).

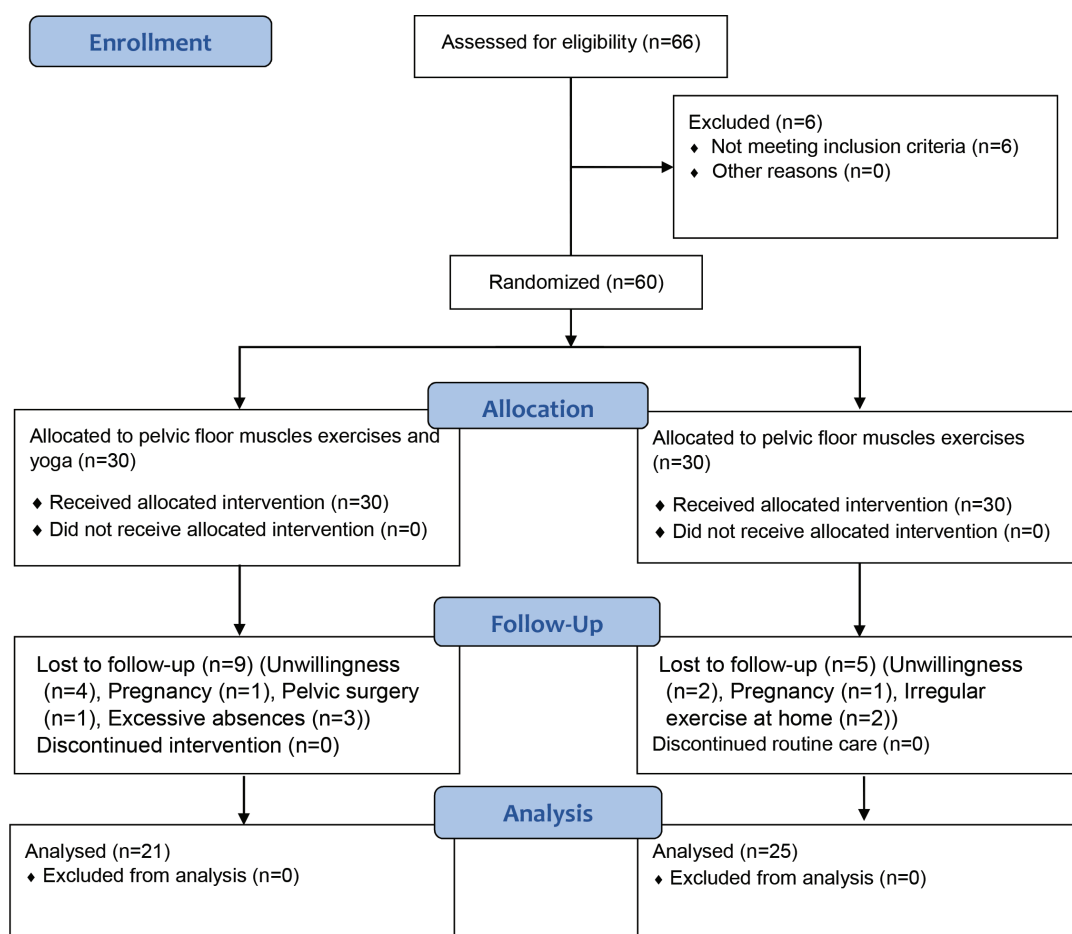


Figure 1: The consort flowchart of the study

$$n = \frac{(S_1^2 + S_2^2) \left(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta} \right)^2}{(\mu_1 - \mu_2)^2} \rightarrow$$

$$\frac{(4.73^2 + 8.24^2)(1.96 + 0.84)^2}{6.0^2} = 21$$

The inclusion criteria were being a 20-54-year-old woman, being in the first marriage, having the ability to read and write, having no alcohol and drug addiction, living with a spouse, living in Shahrekord city, having no known underlying physical and mental illness based on self-report, not being pregnant and not breastfeeding, having no history of sexual abuse based on self-report, taking no drugs that affect sexual function (diuretics, sympatholytics, alpha-blockers, beta-blockers, antipsychotics, antidepressants, histamine receptor blockers, gonadotropin-releasing hormone agonists, oral contraceptive pills), having no sexual function problems based on self-report, and having no history of surgery in the genital and pelvic areas. Exclusion criteria included any type of stress or physical/mental problem that affects the sexual relations of samples during the intervention, unwillingness to continue attending the study, absence in more than a third of training sessions in the intervention group, and no regular exercising at home in both groups. Data collection tools included a demographic information form, the Female Sexual Function Index (FSFI), and the Zeanah and Schwarz Sexual Self-Esteem Inventory for women- Short Form (SSEI-W-SF).

The index questionnaire of women's sexual function was designed by Rosen et al. in 2000, which includes 19 questions and measures women's sexual function in six areas: desire, arousal, lubrication, orgasm, sexual satisfaction, and sexual pain. Evaluation is done through the Likert scale. The scores considered for the questions in the field of desire (1-5), sexual stimulation, moisture, orgasm and pain (0-5), and sexual satisfaction (1-5). Within the individual domains, a domain score of zero means that the person has not had sexual activity during the last 4 weeks. The scores of each field

are obtained by summing the scores of the questions of each field and multiplying it by the fixed factor number. The total score of the FSFI for each domain is from 2 to 36. A higher score is associated with a lower degree of sexual dysfunction. In this way, a higher score indicates a better sexual function. Based on equal weighting of the areas, the maximum score for each domain will be 6 and for the whole scale 36. The minimum score for the field of sexual desire (1.2), sexual stimulation, vaginal moisture, orgasm and pain (0), and satisfaction (0.8), and the whole scale, the minimum score is 2.²² The validity and reliability of this questionnaire were conducted in Iran by Khadijah Mohammadi and colleagues in 2010, and Cronbach's alpha internal consistency coefficient of 0.70 and above was used for reliability. The validity of the Persian version showed a significant difference ($P < 0.001$) between the average scores of the whole scale and each domain in the case and control groups.²³

The SSEI-W, which has 35 items, was compiled by Zina and Schwarz to measure effective answers in women's self-evaluation of sexuality.²⁴ Farrokhi and Share conducted standardization research on this questionnaire in Iran. The standardization process led to the removal of items 1, 3, and 33 due to the factor load of less than 0.30 from the total number of items and the reduction of the number of items from 35 items to 32 items for the Iranian society.²⁵ In this study, a version with 32 questions was used. The questions are answered on a 6-point scale from completely disagree to completely agree. Items 4, 5, 9, 11, 12, 15, 16, 18, 19, 20, 21, 24, 25, 26, 27, 29, and 31 are reverse scored. This questionnaire has five subscales reflecting the areas of sexual self-esteem which include experience and skill, control, attractiveness, moral judgment, and conformity. The total score of the scale is obtained by adding the scores of 5 areas. The range of scores is from 32 to 192 and the average number is 112; also, a score higher than 112 indicates higher sexual self-esteem. Cronbach's alpha coefficient was reported

0.92 for the whole scale, 0.84 for skill and experience, 0.88 for attractiveness, 0.80 for control, 0.80 for moral judgment, and 0.80 for conformity.^{24,25} In the research of Farrokhi and Share, this questionnaire was validated, and the results showed that the internal consistency coefficient of the items in the whole sample was 0.88. Also, the correlation coefficients between each item and the total score were 0.54 to 0.72. In the exploratory factor analysis, five factors were obtained; they explained 50% of the variance. The retest reliability coefficient for the whole scale was 0.91. Both groups completed the questionnaires at three time intervals (before the intervention, immediately after the intervention, and one month after the intervention).

First, women in both groups in a briefing session received some explanation about the stages of the natural sexual cycle, a brief description of the role of pelvic floor muscles, and the correct way to exercise the pelvic floor muscles by the respective trainer. Three exercise sections in one day for pelvic floor muscles were designed by the trainer and the researcher based on the available evidence including the standard bridge movement of Setu Bandha Sarvangasana, Vajrasana's both knee pose, and Kegel movement. To perform the movements correctly, we provided the participants with educational pamphlets in both groups. The participants in both groups were asked to perform these movements 3 times a week for 6 weeks, with 3 times a day repetition. Pelvic floor exercises at home should be done 3 times a day, 3 to 5 times each time in a period of 3 to 5 inhales and exhales. The participants in both groups had to increase the duration of muscle contraction and the number of movements as time passed by performing these movements based on their ability. To ensure that the exercises are performed in an effective manner and at the intended frequency, the researcher made a follow-up call weekly. A was the samples were also provided with a checklist to perform the exercises daily and present an accurate weekly report. Also, a social

network group was formed in the Eitaa and WhatsApp applications, and all notifications were made through these roots in addition to text messages and phone calls.

In addition to performing pelvic floor muscle exercises at home, samples in the intervention group A participated in a yoga training program. This program which lasted for 12 sessions was designed by the researcher and a yoga instructor with a coaching degree in this field. The trainings were implemented in one of the sports centers of Shahrekord city. The yoga exercise program was carried out in 2 in-person sessions per week for 6 weeks, with each session lasting from 45 minutes in the first 4 weeks to 75 minutes in the final weeks, with varying degrees of intensity. The training program in each session consisted of three parts: warm-up movements (Pawanuktasana), sun salutation cycle, main cycle movements (Asana), and cooling and relaxation (Savasana). The exercises started at a low-intensity level and progressed gradually. If necessary, the selected exercises were adjusted for the subjects who could not maintain their posture while doing it; in this way, the principle of paying attention to the individual differences was observed. Also, the principle of overload was observed by increasing the repetition of movements in each session compared to the previous session. At the beginning of each session, joint and muscle warm-up exercises were performed for 15-20 minutes (Pawanuktasana). These warm-up exercises included 3 general categories of movements including joint warm-up, core muscle warm-up, and movements related to unblocking the energy paths. Then, 10 minutes of the training were dedicated to the sun salutation cycle. The movements in this cycle included stretch, strength, balance, contraction, and inversion movements. After performing the sun salutation cycle, the main cycle movements (Asana) designed by the yoga instructor were performed in 20 minutes. Finally, 10 to 15 minutes were considered at the end of the exercise for cooling and relaxation movements

(Savasana).²⁶⁻³⁰ The relevant questionnaires were completed by both study groups at three time intervals (before, immediately after, and one month after the interventions). The data obtained from the questionnaires were analyzed in the SPSS software version 16 using descriptive and analytical statistical tests. A significance level of less than 0.05 was considered for all tests. To provide descriptive statistics, we used the number and percentage for qualitative variables and the mean and standard deviation for quantitative variables. Also, the association between the variables was done using the chi-square test, Fisher’s exact test, independent T-test, repeated measurement test, and analysis of covariance. The analysis of covariance (to control the confounding effect of marriage duration and score before the intervention) was used to compare the scores immediately and one month after the intervention. Also, the interaction between the group effect and time effect was not statistically significant in the repeated measurement analysis. In this

study, only the analyzer was blinded.

The present study was approved by the Research Ethics Committee of Shahrekord University of Medical Sciences (IR.SKUMS.REC.1402.061). All participants signed an informed written consent at the beginning of the study and data confidentiality, voluntary participation, and the right to withdraw from the study were guaranteed.

RESULTS

The mean age of the participants in the pelvic floor muscles exercises plus the yoga group and the pelvic floor muscles exercise group was 32.00±5.87 and 30.48±4.50 years, respectively. There was no statistically significant difference between the two groups’ mean age (P=0.33). Also, the mean duration of marriage in the pelvic floor muscles exercises plus yoga group and the pelvic floor muscles exercise groups was 4.48±1.66 and 3.40±1.63 years, respectively (P=0.03). Analysis of covariance was used to control the confounding variables.

Table 1: Determining and comparing the demographic characteristics of the studied groups

Variable	Category	Intervention group		P value
		Yoga+Pelvic floor muscles exercise N (%)	Pelvic floor muscles exercise N (%)	
Housing	Tenant	8 (38.10)	12 (48.00)	0.50*
	Land lord	13 (61.90)	13 (52.00)	
Women education	Associate degree	2 (9.50)	0 (0.00)	0.14**
	Bachelor	11 (52.40)	14 (56.00)	
	Masters	6 (28.60)	11 (44.00)	
	Doctorate	2 (9.50)	0 (0.00)	
Husband education	Diploma	2 (9.50)	0 (0.00)	0.11**
	Associate degree	3 (14.30)	0 (0.00)	
	Bachelor	9 (42.90)	16 (64.00)	
	Masters	6 (28.60)	8 (32.00)	
	Doctorate	1 (4.80)	1 (4.00)	
Women Job	Administrative Officer	20 (95.20)	25 (100.00)	0.46**
	Service department employees	1 (4.80)	0 (0.00)	
Husband job	Governmental	10 (47.60)	14 (56.00)	0.57*
	Freelance	11 (52.40)	11 (44.00)	
Method of pregnancy prevention	Condom	6 (28.60)	10 (40.00)	0.67**
	Natural	11 (52.40)	13 (52.00)	
	No method	3 (14.30)	1 (4.00)	
	Condom+natural	1 (4.80)	1 (4.00)	

*Chi-square test, **Fisher’s exact test

The mean number of ideal children in the pelvic floor muscles exercises plus yoga group was 1.87 ± 0.83 and in the pelvic floor muscles exercises group 1.47 ± 0.83 ($P=0.20$). Other demographic characteristics are displayed in Table 1.

The results showed no statistically significant difference between the two intervention groups in terms of mean of sexual function score before the intervention ($P=0.21$). However, immediately after the intervention, a statistically significant difference was observed between the two groups' mean sexual function score ($P<0.001$). The results showed no statistically significant difference between the two groups in terms of sexual function one month after the intervention ($P=0.35$) (Table 2).

The results also showed no statistically significant difference between the two intervention groups' mean sexual self-esteem score before the intervention ($P=0.22$). However, immediately after the intervention, a statistically significant difference was observed between the two groups' mean sexual self-esteem score ($P<0.001$). The results showed no statistically significant

difference between the two groups in sexual self-esteem scores one month after the intervention ($P=0.59$) (Table 3).

DISCUSSION

The results of this study showed that adding yoga exercises to the pelvic floor muscle exercises improved the sexual function of reproductive-age women. A study showed that yoga techniques could significantly improve the mean score of sexual function and its dimensions, as well as the mean score of women's quality of sexual life.²¹ Yoga adjusts the level of attention and breathing, reduces anxiety and stress, creates a state of relaxation, and modulates the parasympathetic activity of the heart, all of which being associated with improved sexual response.³¹ In a cross-sectional descriptive study in Indonesia, which was conducted to analyze the effect of yoga on improving women's sexual function, the results showed that Yoga is associated with women's sexual function. Women who are married or have a partner can do yoga regularly because yoga has benefits for health and improves the sexual quality of women.³²

Table 2: Comparison of the mean score of the sexual function index between and within two the intervention groups, before the intervention, immediately after the intervention, and one month after the intervention

Variable	Group	Before intervention Mean±SD	Immediately after the intervention Mean±SD	One month after the intervention Mean±SD	P value
Sexual function index	Yoga+Pelvic floor muscles exercise	25.64±5.33	31.43 ±3.76	26.43±4.97	<0.001***
	Pelvic floor muscles exercise	27.14±3.40	29.41± 2.38	28.41±5.30	0.11***
P value		0.21*	<0.001**	0.35**	---

*Independent T-test; **Analysis of covariance; ***Repeated measures test

Table 3: Comparison of the mean of sexual self-esteem between and within the two intervention groups, before the intervention, immediately after the intervention, and one month after the intervention

Variable	Group	Before intervention Mean±SD	Immediately after the intervention Mean±SD	One month after the intervention Mean±SD	P value
Sexual self-esteem	Yoga+Pelvic floor muscles exercise	159.43± 26.75	181.19±19.90	161.95±22.79	<0.001***
	Pelvic floor muscles exercise	167.28± 15.67	171.32±15.02	169.40±15.93	0.10***
P value		0.22*	<0.001**	0.59**	---

*Independent T-test; **Analysis of covariance; ***Repeated measures test

In this regard, a study conducted to investigate the relationship between the level of physical activity and sexual function in middle-aged women, the results showed that physical activity had a positive effect on the sexual function of middle-aged women.³³ In another study, which was conducted to investigate the effects of physical fitness and self-concept on sexual function, the results showed a positive relationship between physical fitness and sexual health.³⁴ Also, in a study that aimed to investigate the effect of pelvic floor muscle exercises on the sexual function of women with pelvic visceral prolapse, it was shown that pelvic floor muscle exercises led to improved sexual function of women. This study also showed that pelvic floor muscle exercises led to increased control, awareness of pelvic floor muscles, improved self-confidence, sense of vaginal tightness, improved libido and orgasm, reduced pain during intercourse, and increased sexual satisfaction in women.³⁵ In the current study, the improvement in the mean scores of sexual functions after pelvic floor exercises was evident in the pelvic floor muscle exercise group, but this upgrade was not significant.

The results of the present study showed that adding yoga exercises to pelvic floor muscle exercises had a significant effect on improving the sexual self-esteem of reproductive-age women. In this regard, a study to understand the effects of physical satisfaction on women's sexual self-esteem showed that a person's understanding of his/her body could play a central role in his/her understanding of sexual self-esteem.^{5, 36} In the study that was conducted to investigate the effect of exercise on body satisfaction and self-esteem as a component of gender and age, the results has shown that exercise is associated with increased self-esteem as it increases health and fitness. This study also showed that regular exercise improved mood, reduced anxiety and depression, and strengthened self-concept and self-esteem.³⁷

Another study, which was conducted to model the relationship between physical

activities and self-esteem and social vitality of female students, revealed that work, sports, and leisure time physical activity had a significant relationship with self-esteem and social vitality of female teachers. Also, the structural equation model analysis showed that self-esteem played a mediating role in the relationship between physical activity and vitality of female teachers.³⁸

Some researchers examined the effects of yoga on the self-esteem of the elderly women admitted in hospital, the self-esteem of undergraduate students in England, the self-esteem and depression of working women, and emotional regulation, self-esteem, and feelings of adolescents.³⁹⁻⁴² They all referred to the positive effect of yoga exercises on self-esteem. It has also been shown that yoga exercises increase positive energy and self-confidence by stimulation of the vagus nerve.⁴⁰

However, a study that investigated the effect of Hatha Yoga exercises on the self-esteem and risk of falling of elderly women showed that, unlike previous studies, yoga exercises did not affect the self-esteem of the elderly women.⁴³ Perhaps the reason for this difference is the training protocol used in this study.

Working women are faced with fewer opportunities to rest, a heavy activity load, and lack of needed energy. This leads to physical and mental fatigue in these women, which ultimately leads to stress due to the inability to manage these demands. Overcoming this requires activities such as exercise and using positive thoughts at every moment. Exercise is an important activity to do regularly; this leads to reduction of stress and tension. Yoga is a sports activity that, ensures physical and mental health through regular practice. These two factors are the main capital of optimal sexual activity.³²

In the current study, the lack of improvement in the average scores of sexual performance index variables and sexual self-esteem one month after the intervention indicates the necessity of regular and continuous yoga exercises to maintain the effect of this exercise on the sexual performance index and sexual self-esteem.

In the present study the main intervention in our opinion was not pelvic floor muscle exercise and it was presented only for the benefit of all the participants from the joint exercise; therefore, it was not discussed, and the focus of the discussion was on the effect of yoga exercises.

Among the limitations of the present study, we can refer to the uncontrollable variables such as personality traits and cultural characteristics, individual differences, socioeconomic status of the participants, and the lack of regular sports culture among Iranians. Therefore, it is suggested that the above variables should be considered in future studies. One of the strengths of the study was holding a yoga session in a group and not in a self-learning way at home, which causes the participants to be encouraged to continue the exercises.

CONCLUSION

Adding yoga exercises to pelvic floor muscle exercises can improve the sexual function and sexual self-esteem of women at their reproductive age. Therefore, it can be said that a safe and practical exercise such as yoga, which does not require special equipment and facilities, can be considered as an auxiliary measure to improve the sexual function and sexual self-esteem of women. Therefore, it is suggested that the members of the healthcare team should consider yoga exercises as a part of health education programs during marriage and family counseling. Also, in future studies, it is possible to examine the effect of yoga exercises compared to other methods in the treatment of sexual disorders in women of reproductive age or to compare these exercises with physical treatments of the pelvic floor in a wider society.

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