Revista Internacional de Andrología 21 (2023) 100333

ASESA
ASOCIACIÓN ESPAÑOLA DE ANDROLOGÍA, MEDICINA SEXUAL Y REPRODUCTIVA

Revista Internacional de
Andrología

www.elsevier.es/andrologia

ORIGINAL ARTICLE

# Beneficial effects of Pilates exercise on female sexual dysfunction: A prospective pilot study

**Fikret Halis, Ahmet Gokce***

*Sakarya University, School of Medicine, Department of Urology, Sakarya, Turkey*

Received 30 December 2020; accepted 19 September 2021
Available online 17 October 2022

**KEYWORDS**
Female sexual dysfunction;
Pilates exercise;
Female Sexual Function Index (FSFI)

**Abstract**
*Objective:* Female sexual dysfunction (FSD) is a significant public health issue, and it has a high global prevalence. Few effective treatment options are available for the treatment of FSD. We conducted a prospective clinical pilot study to investigate the beneficial effects of Pilates exercise on sexual function in women with FSD.
*Methods:* Women aged between 20 and 50 years and who had regular menstrual cycles and sexual relationships and participating Pilates exercise program were asked to complete Beck Depression Inventory (BDI) and Female Sexual Function Index (FSFI) questionnaires before starting the Pilates exercise program. If the total FSFI score was less than 26.55, which is the cut-off for FSD, the subject was invited to participate in the study. Primary endpoints were changes in total and individual domain scores on the FSFI and BDI.
*Results:* A total of 36 premenopausal women were included in the study. After a 12-week Pilates program, all domains of the FSFI were significantly improved, with mean $\pm$ SD total FSFI scores increasing from $12.0 \pm 4.9$ to $29.3 \pm 3.4$ ($P < 0.0001$). BDI scores were significantly decreased from $25.1 \pm 14.3$ to $1.6 \pm 3.7$ ($P < 0.0001$) after the exercise program.
*Conclusions:* This pilot study showed that Pilates exercise could improve sexual functions in women with FSD. Pilates may facilitate the treatment of sexual dysfunction in women.


* Corresponding author.
*E-mail address:* aagokce@yahoo.com (A. Gokce).

https://doi.org/10.1016/j.androl.2021.09.003
1698-031X/

**PALABRAS CLAVE**
Disfunción sexual femenina;
Ejercicio de Pilates;
Índice de función sexual femenina

**Efectos beneficiosos del ejercicio de Pilates en la disfunción sexual femenina: un estudio piloto prospectivo**

**Resumen**
*Objetivo:* La disfunción sexual femenina (DSF) es un importante problema de salud pública, y tiene una alta prevalencia mundial. Se dispone de pocas opciones terapéuticas eficaces para el tratamiento de la DSF. Realizamos un estudio piloto clínico prospectivo para investigar los efectos beneficiosos del ejercicio de Pilates en la función sexual de las mujeres con DSF.
*Métodos:* A las mujeres de entre 20 y 50 años que tenían ciclos menstruales y relaciones sexuales regulares, y que participaban en el programa de ejercicios de Pilates se les pidió que completaran los cuestionarios del Inventario de Depresión de Beck (BDI) y del índice de función sexual femenina (FSFI) antes de comenzar el programa de ejercicios de Pilates. Si la puntuación total del FSFI era inferior a 26,55, que es el punto de corte para la FSD, se invitaba al sujeto a participar en el estudio. Los puntos finales primarios fueron los cambios en las puntuaciones totales y de dominio individual en el FSFI y el BDI.
*Resultados:* Un total de 36 mujeres premenopáusicas fueron incluidas en el estudio. Después de un programa de Pilates de 12 semanas, todos los dominios del FSFI mejoraron significativamente, con puntuaciones medias $\pm$ SD del FSFI total que aumentaron de 12,0 $\pm$ 4,9 a 29,3 $\pm$ 3,4 ($p < 0,0001$). Las puntuaciones del BDI disminuyeron significativamente de 25,1 $\pm$ 14,3 a 1,6 $\pm$ 3,7 ($p < 0,0001$) después del programa de ejercicios.
*Conclusiones:* Este estudio piloto mostró que el ejercicio de Pilates podría mejorar las funciones sexuales en las mujeres con FSD. El Pilates puede facilitar el tratamiento de la disfunción sexual en las mujeres.


## Introduction

Female sexual dysfunction (FSD) is a disturbance in sexual functioning, a prevalent disorder that dramatically affects the quality of life and causes obvious distress and interpersonal difficulty. The International Consensus Development Conference on Female Sexual Dysfunction classified FSD into four disorders, designated sexual desire disorders, sexual arousal disorders, orgasmic disorders, and sexual pain disorders.[1] The prevalence of FSD is high worldwide and varies between 8% and 78%, depending on how the phenomenon is explored and sample composition.[2,3] Although various medical conditions and psychological problems are associated with FSD, FSD is also strongly associated with physical health status and significantly affects general well-being and quality of life.[4] Interest in therapeutic approaches for FSD, including psychotherapy, behavioral therapy, medication, acupuncture, physical exercise, and gene therapy, has increased in recent years.[5]

Epidemiological studies confirmed that the absence of regular physical activity might contribute to many chronic diseases, including cardiovascular diseases, certain tumors, diabetes, obesity, and osteoporosis.[6] Daily regular exercise improves physical fitness, and this is directly related to better performance of daily tasks and seems to increase vigor, reduce fatigue and improve subjective well-being and quality of life. Physical activity also has positive effects on depression symptoms and acts as an efficient antidepressant.[7] These effects provide a theoretical basis for an association between Pilates exercise and improvement in sexual function. Although many studies report the impact of daily exercise on many aspects of women's health, only one study has investigated the effect of Pilates exercise on sexual function in healthy women.[8] This pilot study aimed to assess the potential therapeutic effects of Pilates exercise on FSD using a validated questionnaire.

## Methods

We conducted a prospective pilot study to investigate the beneficial effects of Pilates exercise on sexual function in women with FSD. The Ethics Committee of the institution approved the protocol for the research project. Women aged between 20 and 50 years and who had regular menstrual cycles and sexual relationships and participating Pilates exercise program were included in the study. Women were asked to complete Beck Depression Inventory (BDI) and Female Sexual Function Index (FSFI) questionnaires before starting the Pilates exercise program. If the total FSFI score was less than 26.55, which is the cut-off for FSD, the subject was invited to participate in the study. Primary endpoints were changes in total and individual domain scores on the FSFI and BDI.

### Inclusion and exclusion criteria

Subjects were eligible if they:

- had a total FSFI score of less than 26.55

- were between the ages of 20 and 50 years and in premenopausal status
- were in a stable, monogamous, heterosexual relationship with the same sexually active partner for at least three months
- had a regular frequency of sexual intercourse
- did not have a history of psychiatric disorder and drug treatment
- did not complain of any organic cause of sexual dysfunction, including anatomical abnormalities
- did not have any other malignancy or chronic diseases which might interfere with mental and sexual health

### Pilates exercise program

Participants attended a 60-min exercise session twice weekly for 12 weeks at the public center. The exercise program was performed by an experienced Pilates instructor based on traditional Pilates principles, including centering, control, precision, concentration, breath and, flow. It consists of the main movements on mats and the movements using traditional Pilates equipment and accessories. Participants were instructed not to perform any exercise program during the exercise period because of the instructors' concern that incorrect practice may impede the outcome.[8,9]

The sexual function of participants, both before and after 12 weeks of Pilates exercise, was evaluated with the Female Sexual Function Index (FSFI), which contains 19 questions and categorizes sexual dysfunction in the domains of desire, arousal, lubrication, orgasm, satisfaction, and pain and evaluates the four phases of female sexual function.[10] This questionnaire is one of the most powerful and useful diagnostic tools for diagnosing FSD and monitoring treatment.[11] A scoring system is developed to obtain individual domain scores, where higher scores indicate a more healthful condition. It was found that an FSFI total score of 26.55 to be the optimal cut score, which means sexual life is considered normal in the patients who scored > 26.55, and pathological in those who scored < 26.55. Scores smaller than: 4.28 on the desire domain, 5.08 on the arousal domain, 5.45 on the lubrication domain, 5.05 on the orgasm domain, 5.04 on the satisfaction domain, and 5.51 on the pain domain were used to classify participants as having difficulties on that domain.[12] The Beck Depression Inventory (BDI) was used to evaluate the potential depressive state, and a relevant cut-off score of 17 points was used during the assessments.

### Statistical analysis

All data were analyzed using SPSS 21.0 for Apple-Macintosh (SPSS, Inc., Chicago, IL, USA). Data are presented as the mean ± standard deviation (range). Chi-square and paired *t*-tests were used to comparisons before and after the exercise program; statistical significance was achieved if $p$ was <0.05.

## Results

Four of the 40 subjects failed to meet the inclusion criteria and were excluded from the study. A total of 36 premenopausal women were included in the study. The characteristics of the study participants are summarized in Table 1. All the participants completed the scheduled 12-week Pilates program. After the intervention, total FSFI scores were significantly improved from 12.0 ± 4.9 (range 7.2–25.5) to 29.3 ± 3.4 (range 21.3–36) ($P < 0.0001$). There was an improvement in participants regarding desire (+136%), arousal (+142%), lubrication (+116%), orgasm (+140%), satisfaction (+183%), pain (+168%) and total FSFI (+143%) scores ($P < 0.0001$ for all) (Table 2). Before the exercise programs, 69.4% (25 subjects) of women's BDI scores were > 17, and this ratio significantly decreased to 2.7% (1 subjects) after intervention ($P < 0.0001$). BDI scores were significantly decreased from 25.1 ± 14.3 to 1.6 ± 3.7 ($P < 0.0001$) after 12-week Pilates intervention.

**Table 1** Demographic characteristics of participants.

| | |
|---|---|
| Age (years) | 32.4 ± 6.1 |
| Marriage (months) | 82.8 ± 12 |
| Currently married | 36 (100%) |
| Education (college) | 17 (47.2%) |
| Employed | 24 (66.6%) |

Data present in mean ± standard deviation for continuous variable and frequency (percent) for dichotomous variables.

## Discussion

The Pilates exercise, which has been considered an option that has gained popularity, is a unique system of stretching and strengthening exercises developed by Joseph H Pilates nearly 90 years ago that employ sets of controlled, precise movements and special equipment.[13,14] The exercises are performed in different positions on the ground with a mat or Pilates apparatus (body conditioning equipment), avoiding excessive impact or pressure on the muscles, joints, and tissues.[14,15] The Pilates exercise aims to achieve better functioning of the body based on the strengthening of the 'powerhouse', a term referring to the lower trunk that supports the body. The second major feature of the method is the six basic principles: centering, concentration, control, precision, breath, and flow.[13–15] A 12-week Pilates exercise trial designed to improve sexual function in women with FSD was conducted in this study. FSD is an important public health issue; it has a high global prevalence, but few effective treatment options are available. Moreover, considering the safety issues with pharmacological options for FSD, investigation of nonpharmacological modalities is warranted.[8] The current study results show that Pilates exercise may have a facilitative role in the treatment of FSD.

In our previous study, we compared the FSFI scores in healthy women without FSD before and after Pilates exercise.[8] It was the first prospective study considering whether a relationship exists between Pilates exercise and female sexual functions in healthy women. The previous study showed that a regular Pilates exercise program positively affects FSFI scores in healthy women without FSD. In the current study, women with FSD were included in the study instead of healthy volunteers. Despite the Pilates exercise's popularity and health claims, no prospective research

**Table 2** Evaluation of sexual function of women before and after Pilates exercise.

| | Before Pilates exercise | After Pilates exercise | Paired *t* test (*p* value) |
|---|---|---|---|
| Desire | 1.9 ± 0.7 | 4.5 ± 0.7 | <0.0001 |
| Arousal | 1.9 ± 0.8 | 4.6 ± 0.7 | <0.0001 |
| Lubrication | 2.4 ± 0.9 | 5.2 ± 0.6 | <0.0001 |
| Orgasm | 2.0 ± 1.2 | 4.8 ± 0.6 | <0.0001 |
| Satisfaction | 1.8 ± 0.9 | 5.1 ± 0.6 | <0.0001 |
| Pain | 1.9 ± 0.9 | 5.1 ± 0.7 | <0.0001 |
| Total FSFI score | 12.0 ± 4.9 | 29.2 ± 3.4 | <0.0001 |

Data are shown as mean ± standard deviations.

has been conducted to measure its therapeutic effects on sexual dysfunction of adult female populations. Our findings suggest the potential for Pilates exercise programs may improve sexual functions in women with FSD and maybe a novel treatment option for FSD.

Very few data are available on the effect of exercise or physical activity on sexual function in women with FSD and without any other disease. Dabrowska et al. found that sexual functioning and general physical activity levels are associated, and a low level of physical activity is correlated with reduced sexual functioning in healthy women.[6] In another study, it was concluded that an intensive residential program with diet, physical exercise, and lifestyle changes are effective in producing weight loss, reducing cardiovascular risk factors, and sexual dysfunctions in obese fertile women.[16] These authors also showed that amelioration of insulin resistance and endothelial function are correlated with net improvements in measures of sexual function. Our current findings also showed that a regular Pilates exercise program has positive effects on FSFI scores of women with FSD.

Changes in female sexual response are closely tied to day-to-day fluctuations in happiness, enthusiasm, calmness, and fear. Importantly, these daily changes in sexual function and affect predominantly occur simultaneously, suggesting that they may, in part, represent manifestations of the same facilitating mechanisms.[8,17] Pilates exercise has health benefits, including enhanced physiological functioning, improved psychological functioning, and learning of functionally effective postural set and motor patterns.[18] Recent studies have shown that when practiced 2 h a week for six months, Pilates exercise has beneficial effects on improving life satisfaction, physical self-concept, and perception of health status in healthy women.[19] Evidence of these studies supports our findings.

## Conclusions

This study is the first prospective study that examines the improvement of sexual function in women with FSD after a 12-week Pilates exercise program. The results of this study suggest that Pilates may facilitate the treatment of sexual dysfunction in women.

## Ethical disclosures

**Protection of human and animal subjects.** The authors declare that no experiments were performed on humans or animals for this study.

**Confidentiality of data.** The authors declare that they have followed the protocols of their work center on the publication of patient data.

**Right to privacy and informed consent.** The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

## Authors' contributions

FH: Data collection and/or processing, AG: Analysis and/or interpretation, literature review, writing, critical review.

## Ethics committee approval

Ethics committee approval was received fort his study from the ethics committee of the institution.

## Informed consent

Written informed consent was obtained from patients who participated in this study.

## Funding

No funding.

## Conflict of interest

There is no conflict of interest between the authors.

## References

1. Basson R, Berman J, Burnett A, Derogatis L, Ferguson D, Fourcroy J, et al. Report of the international consensus development

conference on female sexual dysfunction: definitions and classifications. J Urol. 2000;163:888–93.
2. Laumann EO, Paik A, Rosen RC. Sexual dysfunction in the United States: prevalence and predictors. JAMA. 1999;281:537–44.
3. Burri A, Schweitzer R, O'Brien J. Correlates of female sexual functioning: adult attachment and differentiation of self. J Sex Med. 2014;11:2188–95.
4. Davison SL, Bell RJ, LaChina M, Holden SL, Davis SR. The relationship between self-reported sexual satisfaction and general well-being in women. J Sex Med. 2009;6:2690–7.
5. Aydin S, Arioglu Aydin C, Batmaz G, Dansuk R. Effect of vaginal electrical stimulation on female sexual functions: a randomized study. J Sex Med. 2015;12:463–9.
6. Dabrowska J, Drosdzol A, Skrzypulec V, Plinta R. Physical activity and sexuality in perimenopausal women. Eur J Contracept Reprod Health Care. 2010;15:423–32.
7. Cabral PU, Canario AC, Spyrides MH, Uchoa SA, Eleuterio Junior J, Giraldo PC, et al. Physical activity and sexual function in middle-aged women. Rev Assoc Med Bras. 2014;60:47–52.
8. Halis F, Yildirim P, Kocaaslan R, Cecen K, Gokce A. Pilates for better sex: changes in sexual functioning in healthy Turkish women after pilates exercise. J Sex Marital Ther. 2016;42:302–8.
9. Kuo YL, Tully EA, Galea MP. Sagittal spinal posture after Pilates-based exercise in healthy older adults. Spine (Phila Pa 1976). 2009;34:1046–51.
10. Rosen R, Brown C, Heiman J, Leiblum S, Meston C, Shabsigh R, et al. The Female Sexual Function Index (FSFI): a multidimensional self-report instrument for the assessment of female sexual function. J Sex Marital Ther. 2000;26:191–208.
11. Meston CM. Validation of the Female Sexual Function Index (FSFI) in women with female orgasmic disorder and in women with hypoactive sexual desire disorder. J Sex Marital Ther. 2003;29:39–46.
12. Wiegel M, Meston C, Rosen R. The female sexual function index (FSFI): cross-validation and development of clinical cutoff scores. J Sex Marital Ther. 2005;31:1–20.
13. Natour J, Cazotti LD, Ribeiro LH, Baptista AS, Jones A. Pilates improves pain, function and quality of life in patients with chronic low back pain: a randomized controlled trial. Clin Rehabil. 2015;29:59–68.
14. Latey P. The Pilates method: history and philosophy. J Body Mov Ther. 2001;5:275–82.
15. Muscolino JE, Cipriani S. Pilates and the ''powerhouse''. J Body Mov Ther. 2004;8:15–24.
16. Aversa A, Bruzziches R, Francomano D, Greco EA, Violi F, Lenzi A, et al. Weight loss by multidisciplinary intervention improves endothelial and sexual function in obese fertile women. J Sex Med. 2013;10:1024–33.
17. Kalmbach DA, Pillai V. Daily affect and female sexual function. J Sex Med. 2014;11:2938–54.
18. Lange CUV, Larkam E, Latta P. Maximizing the benefits of Pilates-inspired exercise for learning functional motor skills. J Body Mov Ther. 2000;4:99–108.
19. Cruz-Ferreira A, Fernandes J, Gomes D, Bernardo LM, Kirkcaldy BD, Barbosa TM, et al. Effects of Pilates-based exercise on life satisfaction, physical self-concept and health status in adult women. Women Health. 2011;51:240–55.