

# Pelvic floor muscle training vs. Pilates exercises on the sexual function of post-menopause women with urinary incontinence

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## Abstract:

**Background:** A significant percentage of postmenopausal women suffer from urinary incontinence (UI), which can impair sexual function. Pelvic floor muscle training (PFMT) is the main treatment to improve UI, and it can also be used to improve sexual function. On the other hand, other forms of intervention, such as Pilates exercises, which require activation of the pelvic floor muscles, have been suggested as a possible adjuvant in UI-related outcomes. **Objectives:** To verify the effectiveness of PFMT vs. Pilates on sexual function in postmenopausal women with UI. **Methods:** 40 postmenopausal women with UI were randomized into two groups: PFMT (n = 20) and Pilates (n = 20). Interventions in both groups were performed for 12 weeks, three times a week, for 30 minutes. Sexual function was assessed using the Female Sexual Function Index (FSFI) questionnaire. Mann-Whitney and Wilcoxon U tests were used for inter and intragroup comparisons, respectively. **Results:** There was no difference in the intergroup comparison, for any FSFI domain ( $p > 0.05$ ). There was a significant intragroup difference, in both groups, in the desire, lubrication and total score domains, with effect sizes ranging from small to large. There were also significant intragroup results for the orgasm and pain domains in the PFMT group, with a small effect size. **Conclusion:** There was no evidence that PFMT is different from Pilates in the sexual function of postmenopausal women with UI, therefore, the choice between PFMT or Pilates may be based on preferences and costs for the patient or health professional.

**Keywords:** Comprehensive health care; women's health; sexual health.

## BACKGROUND

According to the International Continence Society (ICS), urinary incontinence (UI) is defined as the involuntary loss of urine<sup>(1, 2)</sup>. Population-based studies have reported that UI is more common in women than men and that approximately 10% of all adult women suffer from UI. Ascension numbers as age advances, reaching 40% in postmenopausal women and up to 50% in women aged  $\geq 70$  years<sup>(3)</sup>. It must be considered that the unwanted loss of urine is noticed by many women, but it is not always reported during consultations. However, a growing awareness of this problem in recent years has encouraged the population to report this dysfunction and seek adequate treatment<sup>(4)</sup>. UI has a tremendous economic impact on the health service, as it causes other problems in women's lives<sup>(3)</sup>. The biggest problems triggered are social isolation, low self-esteem, depression, bowel movements, and sexual problems, which lead to psychological, physical, professional, and social consequences<sup>(5, 6)</sup>.

Urinary incontinence (UI) can impair female sexual function, as urine loss can occur during sexual intercourse, thus triggering less sexual desire, less trying, difficulty reaching orgasm, difficulty ejaculating, and sexual satisfaction. In addition, there may be nocturnal losses associated with the urgency and need to urinate in bed, causing fear of leaks and nasty smells, causing the woman to have a change in her image and self-esteem, directly impacting her sexual function and discouraging her performance of

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the sexual act<sup>(5-9)</sup>. Therefore, the impact on sexual function must be considered when choosing the treatment that will address incontinent postmenopausal women.

Pelvic floor muscle training (PFMT) is the conservative treatment considered the first intervention option for incontinent women (intervention considered the gold standard for the treatment of UI), to improve the function of the pelvic floor muscles (PFM) in terms of strength, resistance and motor coordination<sup>(10, 11)</sup>. PFMT is also helpful to reduce symptoms related to various pelvic disorders, and consequently improve female sexual function<sup>(1, 5, 7, 9, 10)</sup>.

Currently, several other modalities that seek to contribute to urinary continence and consequently improve sexual function are being researched. Pilates exercises are a possibility to improve these issues, and it has been gaining acceptance because it is sought mainly by older and post-menopausal women<sup>(12, 13)</sup>, who often suffer from UI and alter their sexual function.

Taking into account that Pilates exercises have a greater emphasis on strengthening the body's stabilizing muscles, known as "core" or "powerhouse", which integrate the activation of the lower abdominal muscles in addition to the coactivation of the transverse and pelvic floor muscles, it is believed that these exercises, by recruiting muscle fibers of the pelvic floor, can produce a significant increase in the strength of this musculature, consequently, to improve the female sexual function<sup>(14-16)</sup>. However, as far as the authors of this study are aware, no randomized clinical trial has sought to verify the effectiveness of Pilates on the sexual function of postmenopausal women with UI. Therefore, the present study aimed to compare the effectiveness of Pilates about PFMT on the sexual function of postmenopausal women with UI.

## METHODS

This is a randomized clinical trial (ClinicalTrials.gov: NCT05446792) carried out in the city of Jacarezinho, state of Paraná, Brazil. The intervention involved 40 postmenopausal women with UI aged between 50 and 70 years. The ethical norms of the Declaration of Helsinki were followed and all participants signed the Informed Consent Form after approval by the Ethics Committee of the State University of Northern Paraná – UENP (opinion: 5,264,703).

The sample calculation for this study was performed using the Bioestat 5.3 program (Instituto Mamirauá, Amazonas, Brazil), taking into account the values of the ICIQ-SF instrument (International Consultation on Incontinence Questionnaire - Short Form), available in a previous study<sup>(17)</sup>. In this case, the mean and standard deviation after the intervention between the Pilates group ( $1.0 \pm 1.15$ ) and PFMT ( $3.42 \pm 3.4$ ) were used, with test power at 80% and alpha value at 0.05, which generated the need for 17 participants in each group. In order to meet possible sample losses, 15% of participants were added to each group, thus totaling twenty women in the Pilates group and twenty in the PFMT group. Recruitment was carried out from March to August 2022, through the exhibition of posters in the city, dissemination on social networks and in places frequently requested by this population, notices on radio stations in the city, and dissemination to general practitioners who normally care for postmenopausal women.

### Inclusion and exclusion criteria

Inclusion criteria were: a) age between 50 and 70 years; b) being naturally post-menopausal (at least one year without menstruation); c) having independence to carry out their activities of daily living; d) reporting urinary loss when performing physical exertion.

Exclusion criteria were: a) hysterectomy or oophorectomy; b) treatment for cancer with hormone therapy; c) presentation of cognitive impairment or neurological diseases; d) performance of any type of physical exercise regularly in the last six months; e) presentation of any serious alteration in the neuromusculoskeletal system; f) inability to

contract the PFM (Oxford scale < 1, measured by digital palpation and by the Epi-no equipment); g) report of pain or discomfort in the vulva or vagina; h) diagnosis of vaginismus; i) pelvic organ prolapse greater than grade II in the Baden-Walker classification system; j) presentation of symptoms of urinary infection at the time of assessment; k) participation in previous pelvic floor re-education programs.

### Randomization and Allocation

The randomization of the sample was secret. A professional in the area who was unaware of the study and the participants, performed the raffle using random numbers that distributed the participants into two groups: PFMT (n= 20); and Pilates (n=20). This same professional delivered the answers in opaque envelopes, which were sealed and contained the answer inside. The participants were duly informed that they could be allocated to either of the two groups at the time of recruitment and selection, and, in addition, the participants and the responsible researchers would know which group each woman would participate in only at the time of delivery of the envelopes.

### Intervention protocols

The interventions took place from May to October 2022, in a private clinic, located in the center of the city of Jacarezinho, state of Paraná, Brazil, which has all the equipment used to carry out both interventions. The sessions had a total duration of twelve weeks, taking place three times a week, lasting approximately 30 minutes, on non-consecutive days. For both interventions, the level of exertion was controlled by the Borg CR10 Scale(18) (light load [Borg ≤ 2], moderate load [Borg 2 and <5], heavy load [Borg ≥ 5 and <7] and close to of the maximum load [Borg ≥ 7]). A moderate level of effort was maintained during the sessions (Borg 3 and 4), as these were post-menopausal women who had not exercised for at least six months. Each time the intensity of the exercises was changed, the new load used was immediately noted in an individual file, containing the training record.

### Pilates Group

For the intervention, a physiotherapist certified in Pilates taught the sessions, which were carried out with a maximum of three participants simultaneously. In the first week, the protocol was aimed at familiarizing the participants with the Pilates exercises, when the correct execution of the movements was demonstrated and each principle of the method was explained: concentration, centralization, precision, breathing, control, and fluidity; and for familiarization with the correct voluntary contraction of PFMs. Participants were instructed and reminded to voluntarily contract the PFMs during each repetition in the concentric phase of the Pilates strengthening exercises. During the stretching exercises, the participant was instructed not to perform the contraction.

The springs were changed according to the evolution of the participants, replacing them with one of greater resistance, according to the reported perceived exertion. The following Pilates equipment and accessories were used: Cadillac Trapeze, Step Chair, Universal Reformer, Ladder Barrel, Wall Unit, Magic Circle, and Swiss ball. Stretching and strengthening exercises were performed in a single series of ten repetitions, totaling ten exercises aimed at the main muscle groups (Figure 1):

Exercise	Equipment
1. Stretching of the knee flexors and spine extensors	Ladder Barrel
2. Stretching of the trunk flexor muscles	Ladder Barrel
3. Stabilization in the lying position, with the knee flexed and raising the pelvis	Cadillac Trapézio
4. Stabilization on 4 supports	Cadillac Trapézio
5. Strengthening the trunk flexor muscles by holding the tower bar	Cadillac Trapézio

6. Strengthening the knee extensor muscles, in a sitting position pushing the pedals	Cadeira Combo
7. Strengthening the hip adductor muscles, with the magic circle	Reformer Universal
8. Strengthening the horizontal flexor muscles of the shoulder	Reformer Universal
9. Stretching of the lateral flexor muscles of the trunk, in a sitting position, with the aid of a Swiss ball	Wall Unit
10. Stretching of the trunk extensor muscles in a sitting position, with the aid of a Swiss ball	Wall Unit

**Figure 1.** Pilates Exercise Program Description.

### Group PFMT

For intervention in the PFMT group, which was not invasive, a second physiotherapist experienced in this type of training, performed the individualized sessions in a specific room for assistance focused on pelvic physiotherapy. In the first week, the protocol was intended to familiarize the participants with the PFMT, when the correct way to activate and relax the pelvic floor musculature was demonstrated. The command used was: "Squeeze and suck the muscles of the vagina". The PFMT was performed in ten maximum voluntary contractions that should be maintained for at least six seconds (the participants were encouraged to sustain the maximum contraction for as long as possible, thus seeking to increase the contraction time each week). The rest interval time between contractions was the same seconds as the contractions. Participants were instructed to perform four series of ten contractions, and at the end of each series of ten contractions, five quick contractions should be performed. Each series was performed in one position, alternately: 1st lying in lateral decubitus, 2nd sitting, 3rd on all fours, and 4th standing.

### Assessments and Instruments

The assessments were performed before and after the three months of intervention by the same professional, but this professional was not blind about the groups.

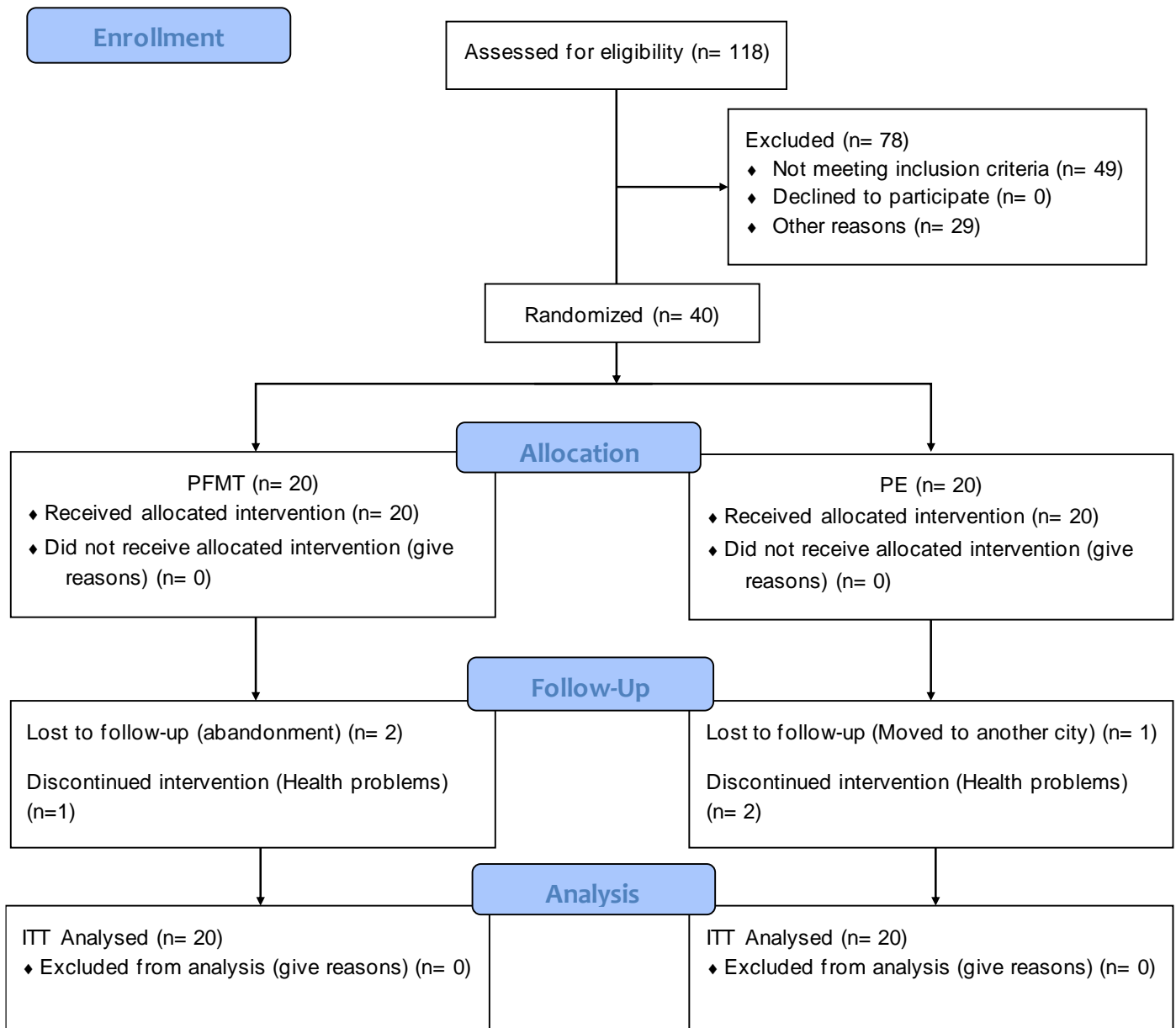
Sexual function was assessed using the FSFI questionnaire (Female Sexual Function Index), translated and validated by Hentschel et al. (2007)(19), which has 19 items that analyze six domains of sexual function: desire, excitement, lubrication, orgasm, satisfaction, and pain. Each question has a possible answer from zero to five or from one to five. To calculate the score for each domain, the individual scores are added and multiplied by the corresponding factor. To obtain the total score, the scores of each domain are added, where values  $\leq 26$  may indicate sexual dysfunction. The participants were interviewed and instructed to answer the questions without the aid or influence of the evaluator. The evaluator only read the questions for a better understanding so that the participant had no doubts about the questions and wrote down the answers reported in the questionnaire.

### Statistical analysis

Data normality was verified using the Shapiro-Wilk test. To compare the differences within each group (intergroup) between pre and post-intervention, the Wilcoxon test was used. The difference ( $\Delta$ ) between groups after the intervention was verified by the Mann-Whitney U test. Effect sizes were calculated using Cohens d, which were considered small (0.2), medium (0.5), or large (0.8). Data were analyzed by intention-to-treat (baseline assessment data were imputed into the final assessment for three participants in the PFMT group and three participants in the Pilates group who dropped out of interventions). The significance level adopted was  $p < 0.05$ . Analyzes were processed using SPSS 20.0 (Chicago, IL, USA).

**RESULTS**

Initially, 118 women were interviewed. After applying the inclusion/exclusion criteria, 40 participants were eligible and agreed to participate in the research. Of these, 34 (85%) completed the study. Three participants in the PFMT group and three more participants in the Pilates group were unable to complete the study. In the PFMT group, dropouts occurred due to: dropping out for no apparent or reported reason, moving to another city, and anxiety and depression. In the Pilates group, the reasons for dropping out were: unexpected travel for two months, family problems, and hypertension (Figure 2).



**Figure 2.** Study flow diagram.

PFMT: Pelvic floor muscle training; EP: Pilates exercises; ITT: Intention to treat.

Table 1 shows the initial characteristics of the participants. In Table 2, it is possible to observe the results of intergroup and intragroup comparisons, related to sexual function, evaluated through the FSFI questionnaire. After the three months of interventions, there was no significant difference in the intergroup comparison, for any domain of the questionnaire ( $p > 0.05$ ).

**Table 1.** Initial characteristics of the participants.

	PFMT (n = 20)	Pilates (n = 20)
Age years)	56,10 (5,26)	61,40 (5,08)
Weight (Kg)	75,35 (13,90)	72,20 (14,99)
Height (cm)	158,95 (7,16)	157,95 (6,67)
BMI (Kg/m <sup>2</sup> )	29,83 (5,60)	28,77 (4,78)
Pregnancies (No.)	3,15 (1,39)	2,65 (1,31)
Last menstruation (years)	8,80 (7,63)	12,9 (6,59)
Urinary incontinence (years)	6,50 (6,62)	8,82 (9,65)
<b>Female Sexual Function Index (FSFI)</b>		
Desire	2,64 (1,16)	2,61 (0,98)
Excitement	2,69 (1,79)	2,28 (2,05)
Lubrication	3,11 (1,91)	2,64 (2,41)
Orgasm	2,99 (1,92)	2,60 (2,31)
Satisfaction	4,16 (1,34)	4,38 (1,48)
Pain	3,18 (2,36)	1,20 (1,28)
Total Score	18,82 (8,61)	15,35 (9,57)

Data expressed as mean and standard deviation; BMI: body mass index.

In the intragroup comparison, it was possible to identify that there was a significant difference for both PFMT and Pilates for improvement in the desire, lubrication and total score domains, with effect sizes ranging from small to large in PFMT and from moderate to large in the Pilates group. In addition, the PFMT group showed intragroup improvement for the orgasm and pain domains, with a small effect size.

**Table 2.** Intra and intergroup comparisons for sexual function assessed by the Female Sexual Function Index (FSFI).

	PFMT (n = 20)	Pilates (n = 20)	Cohen's d (intergrupos)	P value‡
<b>Desire</b>				
Pre-intervention	2,64 (1,16)	2,61 (0,98)		
Post-intervention (12 weeks)	3,21 (1,16)	2,93 (1,16)		
Difference ( $\Delta$ )	0,57 (0,71)	0,31 (0,57)	0,40	0,289
P (intragroup)†	0,005	0,022		
Cohen's d (intragroup)	0,82	0,59		
<b>Excitement</b>				
Pre-intervention	2,69 (1,79)	2,28 (2,05)		
Post-intervention (12 weeks)	3,06 (1,80)	2,86 (1,87)		
Difference ( $\Delta$ )	0,37 (0,89)	0,58 (1,26)	0,19	0,904
P (intragroup)†	0,077	0,055		
Cohen's d (intragroup)	0,35	0,41		
<b>Lubrication</b>				
Pre-intervention	3,11 (1,91)	2,64 (2,41)		
Post-intervention (12 weeks)	3,72 (2,32)	3,48 (2,32)		
Difference ( $\Delta$ )	0,61 (1,14)	0,84 (1,28)	0,19	0,355
P (intragroup)†	0,040	0,001		
Cohen's d (intragroup)	0,41	0,78		

<b>Orgasm</b>				
Pre-intervention	2,99 (1,92)	2,60 (2,31)		
Post-intervention (12 weeks)	3,68 (2,24)	3,26 (2,11)		
Difference ( $\Delta$ )	0,69 (1,16)	0,66 (1,66)	0,02	0,529
P (intragroup)†	0,019	0,137		
Cohen's d (intragroup)	0,44	0,39		
<b>Satisfaction</b>				
Pre-intervention	4,16 (1,34)	4,38 (1,48)		
Post-intervention (12 weeks)	4,28 (1,38)	4,10 (1,68)		
Difference ( $\Delta$ )	0,12 (0,76)	-0,28 (2,09)	0,25	0,738
P (intragroup)†	0,525	0,774		
Cohen's d (intragroup)	0,14	0,16		
<b>Pain</b>				
Pre-intervention	3,18 (2,36)	1,20 (1,28)		
Post-intervention (12 weeks)	3,84 (2,43)	1,20 (1,29)		
Difference ( $\Delta$ )	0,66 (1,48)	0,00 (0,77)	0,56	0,081
P (intragroup)†	0,041	0,944		
Cohen's d (intragroup)	0,38	0,00		
<b>Total Score</b>				
Pre-intervention	18,82 (8,61)	15,35 (9,57)		
Post-intervention (12 weeks)	21,86 (9,90)	21,86 (9,90)		
Difference ( $\Delta$ )	3,03 (4,31)	2,07 (3,70)	0,24	0,904
P (intragroup)†	0,020	0,017		
Cohen's d (intragroup)	0,50	1,74		

Data expressed as mean and standard deviation; †Wilcoxon test; ‡Mann-Whitney U test (intergroup comparison).

## DISCUSSION

In our study, it was possible to observe that after three months of intervention involving PFMT and PE, there was no significant difference between groups for improvement of sexual function. In the cross-sectional study carried out by Hentschel et al (2007)<sup>(17)</sup>, which validated the Female Sexual Function Index - FSFI questionnaire for the Portuguese language, the researchers described the challenges to specifically measure the degree of female sexual satisfaction, since that several variables (psychological, biological, regulatory, cultural patterns) interact with each other for sexual satisfaction to occur, which may influence the total score. In our study, it was not possible to identify a significant intragroup difference for the sexual satisfaction domain, which can be justified due to this information already presented at the time of validation of the FSFI.

In the clinical trial published by Piassarolli et al (2010)<sup>(20)</sup>, researchers used PFMT to verify improvement in women's sexual function and found significant results for all variables of the FSFI questionnaire. The researchers mentioned that performing PFMT can generate benefits such as increased pelvic vascularization and clitoral sensitivity, thus promoting better arousal and lubrication, making it easier to reach orgasm. Strengthening the pelvic floor muscles promotes an orgasmic response in women, due to the sensorimotor reflex that enables more intense contractions of the perineal muscles, increasing circulation in the clitoris. According to these researchers, interventions with PFMT benefit sexual function, since it is easy to apply and low cost, promoting lasting results in women.

In our study, although we did not find significant intergroup differences, it is important to emphasize that in the intragroup comparison (secondary analysis), interventions with PFMT stood out when compared with PE interventions, showing significant results in five of the seven variables of the FSFI, whereas the EP group showed significance in three of the seven variables. As PFMT interventions are specific for activating the pelvic floor muscles, they can contribute more incisively to increasing awareness and proprioception of the perineal muscles, leading to greater receptivity during sexual intercourse, and increasing FSFI values in the postoperative period. evaluation<sup>(21, 22)</sup>.

Nazarpour et al (2019)<sup>(22)</sup>, conducted a randomized controlled trial with 97 postmenopausal women. One group underwent 12 weeks of interventions with PFMT, and the control group received general information about menopause for the same period. Participants' sexual function was assessed using the FSFI questionnaire. After the intervention, the domains: arousal, orgasm, and satisfaction were significantly higher in the PFMT group compared to the control group ( $P < 0.05$ ). This study showed a significant result in three of the seven variables analyzed by the FSFI, similar to the results found in the PFMT group in our study.

In another study, carried out by Zahariou, Karamouti, and Papaioannou(2008)<sup>(9)</sup>, which also had the objective of evaluating the effects of PFMT on sexual function in a group of women with urinary incontinence, the authors verified that the strengthening of pelvic floor muscles contributed to the occurrence of a spontaneous pre-contraction of the pelvic floor muscles before and during physical stress (penetration and orgasm), helping to reduce episodes of urinary leakage during sexual intercourse, especially at the time of penetration and intercourse. orgasm, phases that end up demanding greater muscular coordination during the sexual act. The results presented by these researchers showed that after twelve months of interventions with PFMT, all domains of the FSFI questionnaire obtained significant results, improving the sexual function of incontinent women.

Serati et al (2015)<sup>(23)</sup> conducted an intervention study, also seeking to verify the benefits of PFMT for improving sexual function, in women aged 40 years on average, who had urinary incontinence. After three months of intervention with PFMT, the authors were able to observe significant results in almost all domains of the FSFI questionnaire, only the lubrication domain did not obtain  $p < 0.05$ . The results found by these researchers also corroborate the findings found in our study.

In general, the use of PFMT seems to contribute to the sexual improvement of incontinent women. According to Zachariou et al (2022)<sup>(24)</sup> and Franco et al (2021)<sup>(25)</sup>, increasing the strength of the pelvic floor muscles is an essential factor in improving female sexual function. In addition, it is likely that when treating urinary incontinence using a gold standard technique<sup>(1, 10, 11)</sup>, the patient's anxiety, insecurity, and fear of losing urine during sexual intercourse will decrease, which may consequently improve function. sexual, in addition to PFMT directly contributing to the improvement of pelvic floor muscle control, also facilitating the achievement of higher scores in the FSFI questionnaire.

Regarding PE, a prospective pilot study carried out by Halis and Gokce (2022)<sup>(26)</sup>, showed the effects of Pilates on the sexual function of adult women who had regular sexual intercourse. The intervention with the PE took place for twelve weeks and the FSFI questionnaire was used as an evaluation instrument. The researchers found positive results in the total score of the questionnaire and in the domain of desire. When compared with our study, the EP group achieved significant intragroup results for three of the seven FSFI variables, very similar to what was found in the previous study. It is important to take into account the age range of participants in both studies. In the previous study, the population was of adults, and in our research, the women were in the postmenopausal period, going through several physiological changes, and even so, it was possible to observe significant results for desire, lubrication, and total score.



An RCT-type study, written by Ferraz et al (2020)<sup>(27)</sup>, randomized 24 women and divided them into two groups: PE with professional supervision and PE without supervision. Participants performed eight weeks of interventions, seeking to verify the effects of Pilates on pelvic floor strength, quality of life, and sexual function. At the end of the study, the authors were able to identify greater results favoring the PE group, which received supervision during the sessions. The results were significant for the FSFI variables, showing that PE improves the sexual function of women, but this study did not present the domains separately, presenting only a total score. Our study also intervened with PE, maintaining supervision in all exercises and progressively increasing the load, and at the end of the study we also observed improvements in some FSFI domains.

A quasi-experimental cross-sectional study carried out by Marques and Braz (2017)<sup>(28)</sup>, to evaluate the effects of PE on female sexual function, was able to verify a significant improvement in the domains: orgasm (0.002), desire (0.049), excitement (0.008) and satisfaction (0.008), from the FSFI questionnaire, with results similar to those found in studies by Hallis and Gokce (2022)<sup>(26)</sup>, Ferraz et al (2020)<sup>(27)</sup> and in our study.

According to Marques and Braz (2017)<sup>(28)</sup>, PE can contribute to the improvement of sexual function by presenting cardiovascular benefits, reducing pain, benefiting the psychological, favoring socialization and acceptance, increasing overall muscle strength and flexibility, and increasing the well-being and quality of life of practitioners. In this way, PE can positively stimulate and contribute to increasing sexual desire, as sexual function is the dynamic combination of emotional, cognitive, and physiological processes and not just physical factors. In addition, the female sexual function is influenced by the feeling of well-being in life and is related to greater body satisfaction and regular physical activity<sup>(29)</sup>.

The PE prioritizes the strengthening of the body's stabilizing muscles, known as "powerhouse". These muscles extend from the base of the ribs to the lower pelvic region, forming an anterior and posterior belt. The muscles in this region are mainly contracted during expiratory work. Thus, one hypothesis is that the contraction of these muscles during PE may contribute to the improvement of female sexual response<sup>(28)</sup>.

Tavares et al (2021)<sup>(30)</sup>, carried out a quasi-experimental study, which sought to investigate the effects of Water Pilates (PE in the aquatic environment) on urinary incontinence, genital self-image, and sexual function, of 26 elderly women who underwent PE for eight weeks, no significant result was found for any FSFI domain. In our study, women performed PE on equipment, diverging from Water Pilates, which may have enabled better results in our study, compared to the study by Tavares et al (2021)<sup>(30)</sup>. Load progression and activation of the pelvic floor muscles are easier to perform on equipment or the ground than in the aquatic environment.

Another, quasi-experimental study carried out by Brondani (2014)<sup>(31)</sup>, which aimed to evaluate the influence of PE on pelvic floor muscle strength and sexual function of nine sedentary women, submitted to ten sessions of Mat Pilates (PE on the ground), it was possible to verify that there was no significant result for any domain of the FSFI questionnaire. Diverging from the results found in our study. A likely justification may have been the reduced number of interventions performed.

Oliveira et al (2018)<sup>(32)</sup> carried out an uncontrolled clinical trial study, in which twelve adult women participated who performed Mat Pilates, associated with perineal exercises, three times a week, for seven weeks, to verify the influence of Mat Pilates on female sexual response. At the end of the study, the authors identified significant results in three of the seven domains of the FSFI questionnaire, corroborating our findings.

In our study, it was possible to verify that in the primary analysis (intergroup) there was no significant difference between PFMT and PE, both techniques can be used to improve the sexual function of postmenopausal incontinent women, but this result must be interpreted with caution when taking into account the secondary analyzes (intragroup), which showed that interventions with PFMT stood out when compared with interven-

tions using PE for this purpose. Another important issue to analyze is that, so far, studies that have used PE to carry out interventions, to analyze the sexual function of women, are mostly: cross-sectional, pilot, quasi-experimental, uncontrolled, and with a small number of volunteers, in addition to not reporting whether during the PE the volunteers were instructed to voluntarily contract the pelvic floor muscles or not, as this information makes a difference for the interpretation and results found in the studies. The risk of bias observed in most of the studies involving PE, end up generating even more doubts and insecurities regarding the indication of PE when the objective is linked to the improvement of sexual function.

Our study was the first randomized, controlled clinical trial that sought to compare the effects of PFMT and PE on sexual function in postmenopausal incontinent women. Furthermore, about PFMT, few studies have explored the effects exclusively of this type of intervention, without the addition of other techniques, on sexuality; and about PE, few studies published so far conducted an RCT following the methodological recommendations to decrease bias and did not have a sample loss greater than 15%, similar to our study. In addition, we used a validated and reliable questionnaire to measure the sexual function of the female population.

A limitation of this study is that the sample included seven women who were not sexually active, which may have led to a decline in the expected results since they did not score in the questionnaire. It is recommended that more robust RCTs with high methodological quality be carried out, for scientific contribution and further clarification on this topic, enabling future studies of the systematic review type with meta-analyses.

## CONCLUSION

It was possible to observe that after three months of intervention, there was no significant difference between PFMT or PE associated with the verbal command during the exercises on the correct contraction of the pelvic floor muscles to improve the sexual function of postmenopausal incontinent women.

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