Effects of physical exercise on postpartum pelvic floor dysfunctions: a randomized placebo-controlled trial

Efeitos do exercício físico sobre as disfunções do assoalho pélvico no pós-parto: um estudo randomizado controlado por placebo

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Abstract

Introduction: The postpartum period is a phase when women are susceptible to pelvic floor muscle dysfunction (PFMD) due to the gestational period; however, there is still a lack of quality evidence evaluating the effects of interventions on pelvic floor muscle recovery in postpartum women. **Objective:** To investigate the effects of pelvic floor muscle training (PFMT) and low pressure fitness (LPF) on discomforts associate with PFMD during the postpartum period. **Methods:** A randomized, placebo-controlled study was conducted with 35 women who gave birth at the Maternal and Child University Hospital (HUMAI) in the city of Ponta Grossa, Brazil. The study tested the effects of LPF and PFMT across three groups: LPF (n = 12), PFMT (n = 12), and minimal intervention/placebo (MI, n = 11). The three groups received the interventions online. **Results:** Training with LPF and PFMT resulted in better outcomes compared to MI for some disorders associated with PFMD after 12 weeks of treatment. LPF was most effective in improving the global score of the Pelvic Floor Bother Questionnaire (PFBQ) at 6 and 12 weeks, in reducing stress urinary incontinence at 12 weeks, and in alleviating dyspareunia at 6 and 12 weeks. **Conclusion:** LPF and PFMT can effectively reduce discomfort associated with PFMD during the postpartum period.

Keywords: Physical exercise. Postpartum period. Women's health. Women's health services.

Resumo

Introdução: *O período pós-parto é um momento em que as mulheres são expostas às disfunções da musculatura do assoalho pélvico (DMAP) devido ao período gestacional, mas ainda faltam evidências de qualidade que avaliem o efeito de intervenções sobre a recuperação da musculatura do assoalho pélvico de mulheres no pós-parto.* ***Objetivo:*** *Investigar o efeito do treinamento dos músculos do assoalho pélvico (TMAP) e do* low pressure fitness *(LPF) sobre o incômodo relacionado às DMAP no pós-parto.* ***Métodos:*** *Estudo randomizado, controlado por placebo, com 35 mulheres que tiveram o parto realizado no Hospital Universitário Materno Infantil (HUMAI), na cidade de Ponta Grossa, Paraná. Foram testados os efeitos do LPF e do TMAP em três grupos: LPF (n = 12), TMAP (n = 12) e intervenção mínima/placebo (IM, n = 11). Os três grupos receberam as intervenções de forma on-line.* ***Resultados:*** *Os treinamentos com LPF e TMAP apresentaram melhores resultados em comparação à IM em alguns distúrbios relacionados às DMAP após 12 semanas de tratamento. O LPF foi mais eficaz sobre o escore global do Pelvic Floor Bother Questionnaire em 6 e 12 semanas, sobre incontinência urinária de esforço em 12 semanas e sobre dispareunia em 6 e 12 semanas.* ***Conclusão:*** *Constatou-se que é possível diminuir o desconforto relacionado às DMAP no pós-parto por meio do LPF e TMAP.*

Palavras-chave: *Exercício físico. Período pós-parto. Saúde da mulher. Serviços de saúde da mulher.*

Introduction

The pelvic floor consists of the dynamic interaction between the endopelvic fascia, the muscles of the levator ani complex, the perineal membrane, the perineal body, and the perineum muscles.[1] This entire structure has the function of supporting the organs of the abdominal and pelvic regions, including the bladder, uterus and intestine, as well as for controlling important physiological functions (such as urination and defecation). Additionally, it plays a critical role during pregnancy, supporting fetal growth, and during childbirth by aiding in the expulsion of the fetus through contractions.

Regardless of the type of delivery, women commonly experience physical, hormonal, and physiological changes throughout pregnancy, childbirth, and the postpartum period. Notable adverse changes reported in the postpartum period include urinary incontinence (UI), pelvic organ prolapse, dyspareunia (discomfort during sexual intercourse) and perineal pain.[2] All these adverse changes may be associated with pelvic floor muscle dysfunction (PFMD).

The viscoelastic properties of the pelvic floor muscles (PFMs) cause their fibers to stretch significantly in preparation for childbirth. However, after childbirth, it may take weeks to months for these fibers to return to their original length and for their contractile ability to be restored. Meanwhile, it is common for women to suffer from disorders related to the loss of contractile capacity of these muscles. In addition, during childbirth, approximately 10% of women undergo injuries (distension or laceration) of the PFM, mainly in the perineal region, which may cause impairment of pelvic floor functions.[3]

Current research does not yet provide strong evidence regarding the relationship between general physical exercise and PFMD. As studies are generally cross-sectional, confounding factors are not considered, and there is substantial variability in case definitions and assessment methods.[4] Existing hypotheses suggest that general physical training may either strengthen or weaken the pelvic floor, but no definitive conclusion has been reached.[5]

National protocols and guidelines recommend the practice of perineal massage before childbirth and emphasize the importance of pelvic floor exercises. However, there is no indication of strong evidence for the use of methods or protocols to exercise PFM as a preventive measure or postpartum treatment, such as pelvic floor muscle training (PFMT) or a more current method, such as low pressure fitness (LPF). The absence of strong recommendations for these practices can be attributed to the difficulty in defining a universal protocol, considering each woman's biological individuality, physical condition, type of delivery, among other factors. PFMT, derived from the method created in the 1950s by gynecologist Arnold Kegel, is a kinesiotherapy technique that basically consists of voluntary contractions of the PFM, alternating isometric contractions and rapid contractions to stimulate the muscle fibers in this region.[6] Alternatively, there is LPF, which is based on postural and respiratory exercises associated with a decrease in pressure in the abdominopelvic cavity. The objectives of LPF are to decrease pressure in the abdominal and perineal cavities, activate the stabilizing muscles of the spine and pelvic floor, and normalize myofascial tensions.[7]

The results found in a comparison of the morpho-functional changes that occurred after a PFMT or LPF protocol for two months during the postpartum period suggest an improvement for LPF in the thickness of the levator ani muscle and in the Broome Pelvic Muscle Self-Efficacy Scale compared to PFMT. However, despite having used the gold standard for the physical evaluation of the variables investigated, the authors used a methodology that was too limited to be considered strong evidence.[8]

Based on the aforementioned considerations, the main objective of this study was to investigate the effects of PFMT and LPF on discomforts associated with PFMD during the postpartum period.

Methods

This is a longitudinal, randomized, placebo-controlled study registered in the Brazilian Registry of Clinical Trials (ReBec) under the code RBR-10scxbgv, with approval from the Research Ethics Committee of the State University of Ponta Grossa (CEP-UEPG), under opinion No. 47184521.2.0000.0105.

Two interventions were tested, PFMT and LPF, in comparison with a placebo. The interventions were administered once a week, individually, with specific live online training, through a video call via the WhatsApp application, lasting 30 minutes. Participants were also instructed to perform 5 minutes of daily maintenance. The evaluator and the participants remained blinded during the application of the interventions.

Participants

The sample size calculation was performed using the G*Power 3.1.9.4 software, considering PFMD as the primary outcome of the study. The effect size was 2.5, $\alpha = 0.05$ and $\beta = 0.8$, number of groups = 3 and number of measurements = 3, resulting in a minimum required sample of 36 individuals.

Initially, 601 women who had given birth at the Maternal and Child University Hospital (HUMAI) in the city of Ponta Grossa, Paraná, in the months of June, July and August 2021 were invited. The postpartum women were approached while waiting for hospital discharge. Of the 601 women invited, 508 (84.5%) agreed to participate in the research after signing an informed consent form.

Forty-five days after the delivery date, the participants received a link to the Google Docs platform via WhatsApp to answer the sociodemographic questionnaires, perception of QoL (World Health Organization Quality of Life - WHOQOL-BREF), discomfort related to PFM disorders (Pelvic Floor Bother Questionnaire - PFBQ), International Physical Activity Questionnaire - IPAQ and Physical Activity Readiness Questionnaire for Everyone - PAR-Q+). Of the 508 links sent, 182 responses were received (35.8%). Before starting the randomization process, the participants were asked if they had any discomfort related to PFM; 90 postpartum women (64.7%) reported no longer having symptoms, indicating a natural improvement in the disorder, and 49 postpartum women (35.2%) reported still having symptoms, meeting the inclusion criteria. After excluding 14 participants who dropped out, 35 postpartum women were randomly assigned to three groups: PFMT (n = 12), LPF (n = 12), and placebo/minimal intervention (MI) (n = 11). Randomization was conducted by an independent researcher using the Random.org website, based on predetermined coding.

Outcome measurements and monitoring

The IPAQ and PAR-Q+ instruments were used to monitor the level of physical activity and identify the need for a medical certificate to begin the interventions. Participants were instructed not to practice physical exercise beyond the intervention they were receiving according to the allocation group.

Primary outcomes, such as discomfort related to PFM disorders, were assessed using the PFBQ scale, translated and validated in Brazil by Peterson et al.[7] This questionnaire allows the assessment of global discomfort (scale ranges from 0 to 45) or for each disorder (0 to 5). According to the scale, 0 is considered to be without the presence of the disorder, 1 represents that there is a disorder but no perceived discomfort (not at all), while 5 represents maximum discomfort (a lot). This result was measured at weeks 0, 6 and 12 in order to assess the effect of the interventions on the outcome. Secondary outcomes included the WHOQOL-BREF, from the World Health Organization (WHO), translated and validated in Brazil by Fleck.[9] The WHOQOL-BREF scores were measured using the tool proposed by Pedroso et al.,[10] in which the overall score and the QoL domains are represented on a scale of 4 to 20. This result was obtained at weeks 0, 6 and 12.

Anthropometric measurements (waist and abdominal circumference) were measured by an evaluator who was unaware of the treatment groups, by positioning a Cescorf® tape measure at anatomical points,[11] recording the results in centimeters. Waist circumference was measured at the midpoint between the last rib and the iliac crest, while abdominal circumference was measured at the level of the umbilicus, with the individual standing after a normal expiration, ensuring no skin compression. These results were measured at the same weeks (0, 6 and 12).

Interventions

The study adopted a randomized, placebo-controlled clinical trial design to evaluate the effects of three different interventions: PFMT, LPF and MI. Participants underwent the interventions through specific live online training lasting 30 minutes, carried out once a week, over the course of 12 weeks. Additionally, all participants were instructed to practice a specific task related to the intervention they were receiving, for 5 minutes daily in a specific position learned during the previous session.

LPF was administered with cycles of three breaths for each vacuum (costal opening), with a progression in the "inhalation:exhalation" times from 2:2 to 2:4 seconds, respecting the individual adaptation of each participant. In each session, there was progression in teaching the fundamentals of the technique, addressing posture, diaphragm release, thoracic breathing, respiratory cycles, and abdominal vacuum. In addition, specific postures at level 1 of the LPF method were worked on in the standing positions (Athena, Venus, Artemis), sitting on the floor (Hestia), on all fours (Maya) and lying in the supine position (Demeter).[7] No equipment was used during the practice of the LPF.

The PFMT was applied with a progression of 8-15 contractions, 8-10 series, lasting 6-8 seconds per contraction, also including fast contractions. The interval between series was 8 to 15 seconds, depending on the number of repetitions performed. In each session, there was progression in teaching the fundamentals of the technique, covering explanations about the muscles of the pelvic floor, abdominal release, breathing and abdominal contraction, lip frenulum and the function of breathing with pelvic contraction. Standing, sitting and lying in the supine position were incorporated, and as in LPF, no equipment was used during the practice of PFMT.

The MI group received relaxation and stretching exercises, including active (unassisted) and static (without movement) stretches, lasting 10-20 seconds each. Each session ended with 5 minutes of general relaxation, controlling the respiratory rhythm under the guidance of a professional. The interventions were conducted by professionals specialized in their respective areas: LPF by a physical education professional specialized in the method, PFMT by a physiotherapist specialized in pelvic physiotherapy, and MI by a physical education professional.

Study procedures

The study procedures were conducted according to a detailed schedule, as shown in Figure 1. All assessments were performed in a standardized manner, with a single evaluator using the same equipment in all phases of the study. The randomization process was performed by a researcher who was not involved in the recruitment or treatment of the participants. The allocation of participants was performed randomly. Participants were informed that they would receive a treatment aimed at PFM recovery but were not made aware of the other interventions being tested. The evaluator was unaware of which groups the participants were allocated to and did not participate in the interventions.

Statistical analysis

Data analysis was conducted by a statistician who was blinded to the treatment groups and was not involved in the previous phases of the study. All statistical procedures adhered to the principles of intention-to-treat analysis. Initially, descriptive statistics were used to summarize the collected data and provide an overview of the variables. Data normality was assessed using the Shapiro-Wilk test.

Differences between groups for primary and secondary outcomes were analyzed using linear mixed models (with random intercepts and fixed coefficients) that incorporated terms for treatment, time, and treatment-by-time interactions. Significance was determined using post hoc Bonferroni adjustments. The coefficients for treatment-by-time interactions provided estimates

of intervention effects, derived from the estimated marginal means in the Statistical Package for the Social Sciences (SPSS, version 20.0 for Windows). The selection of linear mixed models was justified by several reasons: 1) this analysis method automatically adjusts for the dependence of estimates from multiple time points (no adjustments were made for other variables); 2) it utilizes data from all time points to compute each treatment estimate; and 3) it optimally handles missing data by predicting the most likely values for patients who were not evaluated at all time points.[12]

All statistical tests were performed with a significance level set at $p < 0.05$, ensuring rigorous interpretation of the results.

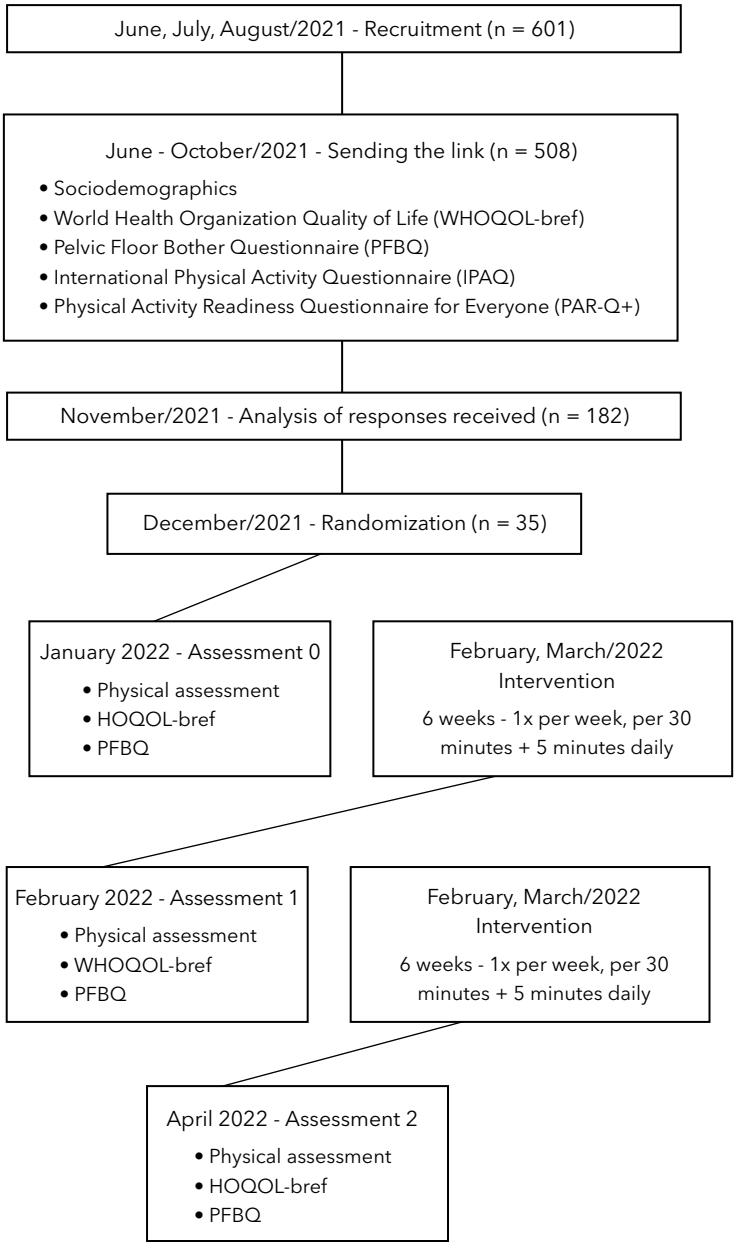

Figure 1 - Flowchart of study procedures.

Results

The study was conducted in Ponta Grossa, Paraná, Brazil, between June 2021 and April 2022, with interterventions delivered online through live individual training sessions. The Consolidated Standards of Reporting Trials (CONSORT) diagram is shown in Figure 2, and the demographic data and baseline values for each measurement for the study groups in Table 1. All participants were postpartum women who had experienced discomfort related to PFM. None of the participants crossed groups during the study. According to the study procedures flowchart, the average postpartum period before the start of the interventions was 6 months.

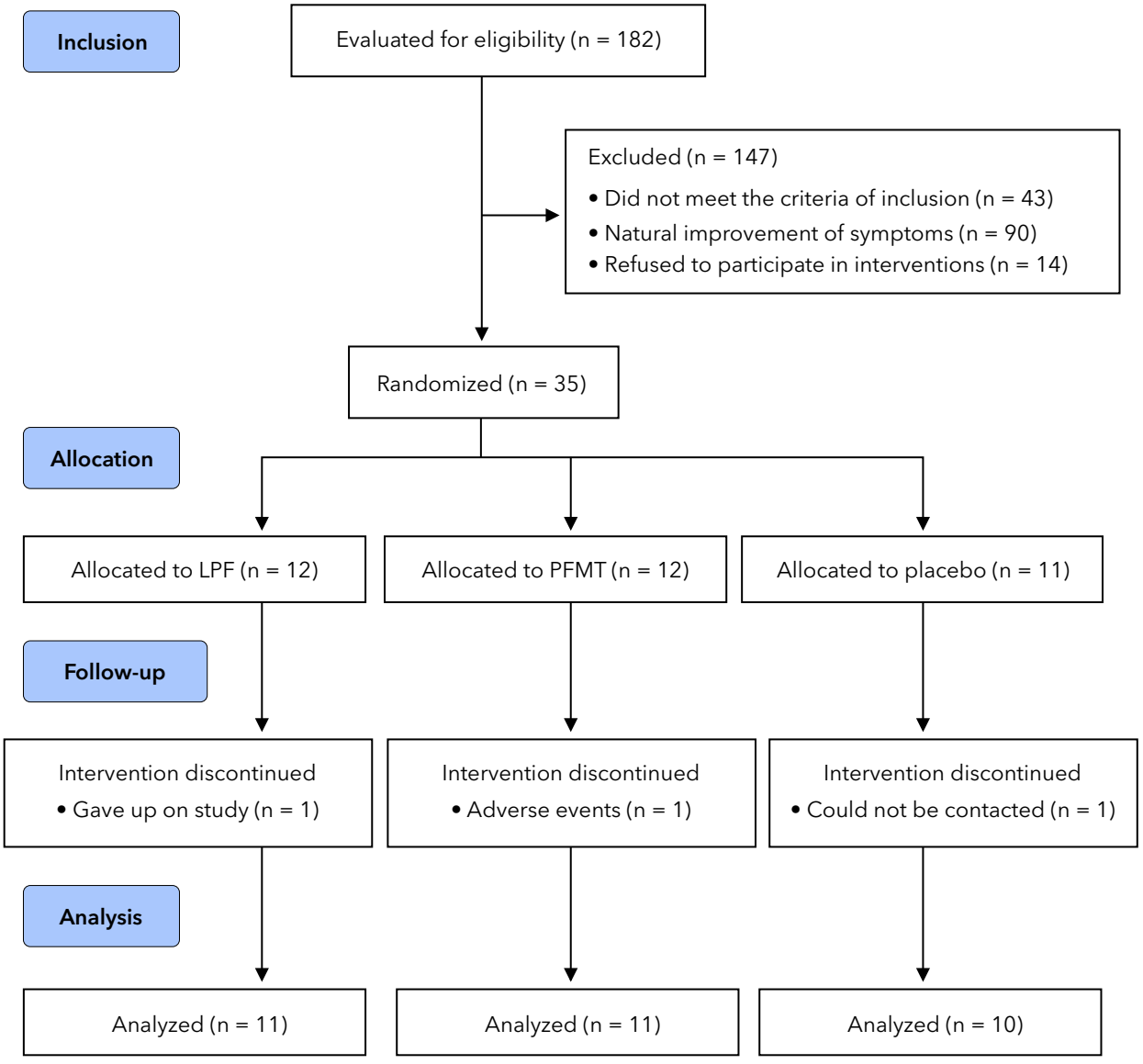

Figure 2 - CONSORT (Consolidated Standards of Reporting Trials) diagram for the study.

Note: LPF = low pressure fitness; PFMT = pelvic floor muscle training.

Table 1 - CBaseline demographic and clinical characteristics

Variables	MI (n = 10)	LPF (n = 11)	PFMT (n = 11)
Age (years)*	27.90 (4.12)	26.90 (6.93)	27.45 (6.78)
Schooling			
High school completed	6 (60.0)	9 (81.8)	8 (72.7)
High school incomplete	4 (40.0)	2 (18.2)	3 (27.3)
Occupation			
Paid	3 (30.0)	6 (54.5)	5 (45.5)
Unpaid	7 (70.0)	5 (45.5)	6 (54.5)
Self-reported health condition			
Very satisfactory	5 (50.0)	-	3 (27.3)
Satisfactory	5 (50.0)	11 (100)	8 (72.7)
Socioeconomic classification			
High	5 (50.0)	3 (27.3)	2 (18.2)
Low	5 (50.0)	8 (72.7)	9 (81.8)
Number of births			
Primiparous	4 (40.0)	7 (63.6)	3 (27.3)
Multiparous	6 (60.0)	4 (36.4)	8 (72.7)
Type of birth			
Vaginal	8 (80.0)	9 (81.8)	10 (90.9)
Cesarean section	2 (20.0)	2 (18.2)	1 (9.1)

Note: MI = minimal intervention/placebo; LPF = low pressure fitness; PFMT = pelvic floor muscle training. *Data expressed as n (%), except for age, expressed as mean (standard deviation).

Discomfort related to PFM disorders

Analysis of the adjusted mean differences between groups, for both the overall PFBQ score and individual disorders, revealed no statistically significant differences across the different time points at the 95% confidence level (Table 2).

As shown in Table 2, the mean intensity of global discomfort related to PFMD (PFBQ scale from 0 to 45) at baseline was higher in the LPF and PFMT groups. The intensity of discomfort decreased in the LPF and PFMT groups after 6 and 12 weeks; however, only in the LPF group was the decrease significant, with a reduction of 7.35 points comparing the initial data with week 6 and 12.40 points comparing the data from the first and last evaluation. When making the same comparison, the PFMT group showed a reduction of 6.37 and 7.23 points, respectively. Notably, in the MI group, scores decreased after 6 weeks but increased again after 12 weeks, as indicated by the mean analysis for each group (Table 2). This fact was observed in the general score (PFBQ), stress urinary incontinence (SUI), increased urinary frequency and nocturia (IUFN), urinary urgency (UUR), pelvic organ prolapse (POP) and dyspareunia (DSP). In the LPF group, this fact was only observed in UUR, while in the PFMT group the dysuria (DYS) and fecal incontinence (FI) scores showed this behavior. Significant reductions were found in the difference between the evaluation periods of the LPF group in SUI after 12 weeks (-2.00) and in DSP after 6 weeks (-0.61) and after 12 weeks (-1.02).

Perception of quality of life

The perception of QoL (scale from 0 to 20) at baseline was similar across the three groups (Table 2). No significant differences were observed in the mean QoL scores between or within groups. The notable trend observed was an increase in overall QoL scores after 6 weeks, followed by a decrease after 12 weeks across all three groups.

Table 2 - Study outcomes for each group and adjusted mean difference between groups

Variable	Mean (standard deviation)			Adjusted mean difference (95% CI)		
	MI	LPF	PFMT	LPF vs MI	PFMT vs MI	LPF vs PFMT
PFBQ (0-45)						
Week 0	10.80 (2.25)	16.90 (3.24)	16.09 (2.97)	-	-	-
Week 6	8.22 (2.47)	9.55 (2.41)[A]	9.71 (2.41)	1.33 (-9.71 to 12.38)	1.49 (-9.55 to 12.54)	-0.15 (-11.07 to 10.75)
Week 12	10.60 (2.75)	4.50 (1.47)[B]	8.85 (2.60)	-6.10 (-16.07 to 3.87)	-1.74 (-13.85 to 10.37)	-4.35 (-13.92 to 5.21)
QoL (0-20)						
Week 0	12.86 (0.49)	12.60 (0.59)	11.88 (0.44)	-	-	-
Week 6	13.05 (0.60)	13.69 (0.60)	12.70 (0.45)	0.63 (-2.09 to 3.36)	-0.35 (-2.77 to 2.06)	0.98 (-1.44 to 3.42)
Week 12	13.01 (0.50)	13.67 (0.58)	12.68 (0.32)	0.66 (-1.81 to 3.13)	-0.33 (-2.25 to 1.59)	0.99 (-1.15 to 3.14)
SUI (0-5)						
Week 0	1.70 (0.51)	2.90 (0.53)	2.54 (0.55)	-	-	-
Week 6	1.33 (0.64)	1.55 (0.61)	2.00 (0.69)	0.22 (-2.62 to 3.09)	0.66 (-2.38 to 3.71)	-0.44 (-3.41 to 2.52)
Week 12	1.50 (0.58)	0.90 (0.45)[B]	0.71 (0.66)	-0.60 (-2.97 to 1.77)	-0.78 (-3.61 to 2.04)	0.18 (-2.38 to 2.75)
IUFN (0-5)						
Week 0	0.70 (0.44)	2.00 (0.58)	1.27 (0.63)	-	-	-
Week 6	0.44 (0.41)	1.22 (0.46)	0.85 (0.55)	0.77 (-1.22 to 2.78)	0.41 (-1.79 to 2.62)	0.36 (-1.94 to 2.67)
Week 12	0.50 (0.47)	0.20 (0.18)	0.57 (0.34)	-0.30 (-1.93 to 1.33)	0.07 (-1.79 to 1.94)	-0.37 (-1.62 to 0.87)
UUR (0-5)						
Week 0	0.90 (0.57)	1.72 (0.69)	2.18 (0.65)	-	-	-
Week 6	0.55 (0.35)	0.22 (0.20)	1.85 (0.84)	-0.33 (-1.65 to 0.98)	1.30 (-1.62 to 4.22)	-1.63 (-4.41 to 1.14)
Week 12	1.40 (0.68)	0.50 (0.32)	1.71 (0.72)	-0.90 (-3.31 to 1.51)	0.31 (-2.85 to 3.48)	-1.21 (-3.73 to 1.31)
IUUR (0-5)						
Week 0	1.00 (0.63)	2.09 (0.70)	2.00 (0.70)	-	-	-
Week 6	1.00 (0.62)	1.00 (0.62)	1.71 (0.82)	0.00 (-2.84 to 2.84)	0.71 (-2.60 to 4.03)	-0.71 (-4.03 to 2.60)
Week 12	1.74 (0.68)	0.50 (0.47)	1.00 (0.67)	-0.90 (-3.55 to 1.75)	-0.40 (-3.45 to 2.65)	-0.50 (-3.12 to 2.12)
DYS (0-5)						
Week 0	0.00 (0.00)	1.63 (0.65)	1.00 (0.53)	-	-	-
Week 6	0.00 (0.00)	1.33 (0.64)	0.00 (0.00)	1.33 (-0.73 to 3.40)	0.00 (0.00 to 0.00)	1.33 (-0.73 to 3.40)
Week 12	0.00 (0.00)	0.50 (0.47)	0.71 (0.66)	0.50 (-1.01 to 2.01)	0.71 (-1.39 to 2.82)	-2.21 (-2.81 to 2.38)
POP (0-5)						
Week 0	0.60 (0.40)	1.18 (0.60)	1.36 (0.67)	-	-	-
Week 6	0.33 (0.31)	1.44 (0.68)	0.71 (0.66)	1.11 (-1.30 to 2.52)	0.38 (-1.95 to 2.72)	0.73 (-2.31 to 3.77)
Week 12	1.10 (0.55)	0.30 (0.28)	0.71 (0.66)	-0.80 (-2.79 to 1.19)	-0.38 (-3.14 to 2.37)	-0.41 (-2.71 to 1.88)
OE (0-5)						
Week 0	2.20 (0.71)	1.63 (0.67)	2.09 (0.70)	-	-	-
Week 6	2.22 (0.73)	0.55 (0.52)	0.00 (0.00)	-1.66 (-4.54 to 1.21)	2.22 (-4.56 to 0.12)	0.55 (-1.11 to 2.23)
Week 12	2.00 (0.64)	0.40 (0.37)	0.00 (0.00)	-1.60 (-4.00 to 0.80)	-2.00 (-4.07 to 0.71)	0.40 (-0.81 to 1.61)
FI (0-5)						
Week 0	1.20 (0.62)	2.00 (0.68)	1.09 (0.58)	-	-	-
Week 6	1.00 (0.62)	1.11 (0.69)	0.00 (0.00)	0.11 (-2.87 to 3.10)	-1.00 (-3.00 to 1.00)	1.11 (-1.10 to 3.32)
Week 12	0.50 (0.47)	0.50 (0.47)	0.71 (0.66)	0.00 (-2.14 to 2.14)	0.21 (-2.38 to 2.81)	-0.21 (-2.81 to 2.38)
DSP (0-5)						
Week 0	2.50 (0.58)	1.72 (0.36)	2.54 (0.53)	-	-	-
Week 6	1.33 (0.52)	1.11 (0.29)[A]	2.57 (0.60)	-0.22 (-2.13 to 1.68)	1.23 (-1.30 to 3.78)	-1.46 (-3.59 to 0.67)
Week 12	2.20 (0.48	0.70 (0.24)[A]	2.71 (0.69)	-1.50 (-3.24 to 0.24)	0.51 (-2.18 to 3.21)	-2.01 (-4.36 to 0.33)

Table 2 - Study outcomes for each group and adjusted mean difference between groups (continued)

Variable	Mean (standard deviation)			Adjusted mean difference (95% CI)		
	MI	LPF	PFMT	LPF vs MI	PFMT vs MI	LPF vs PFMT
WAIS (cm)						
Week 0	82.42 (3.79)	83.31 (2.24)	82.45 (3.01)	-	-	-
Week 6	80.47 (3.89)[A]	82.33 (2.09)	79.72 (3.72)	1.85 (-12.28 to 15.99)	-0.75 (-17.99 to 16.48)	2.60 (-11.06 to 16.27)
Week 12	81.25 (3.64)	81.51 (2.14)	81.08 (3.55)	0.26 (-13.25 to 13.77)	-0.16 (-16.43 to 16.10)	0.42 (-12.83 to 13.68)
ABD (cm)						
Week 0	91.68 (4.05)	96.24 (2.80)	92.53 (3.34)	-	-	-
Week 6	89.84 (4.41)[A]	93.54 (2.74)	89.95 (4.11)	3.69 (-12.92 to 20.31)	0.10 (-19.18 to 19.39)	3.59 (-12.23 to 19.41)
Week 12	89.96 (3.83)[A]	93.35 (2.55)	90.58 (3.87)	3.39 (-11.35 to 18.13)	0.62 (-16.82 to 18.07)	2.76 (-12.08 to 17.61)

Note: MI = minimal intervention/placebo; LPF = low pressure fitness; PFMT = pelvic floor muscle training; PFBQ = Pelvic Floor Bother Questionnaire; QoL= quality of life; SUI = stress urinary incontinence; IUFN = increased urinary frequency and nocturia; UUR = urinary urgency; IUUR = urinary incontinence of urgency; DYS = dysuria; POP = prolapse of pelvic organs; OE = obstructed evacuation; FI = fecal incontinence; DSP = dyspareunia; WAIS = waist circumference; ABD = abdomen circumference. [A]Significant difference compared with week 0 at 95% confidence level. [B]Significant difference compared with week 0 at 99% confidence level.

Waist and abdominal circumference

At baseline, waist and abdominal circumference measurements were similar in the MI and PFMT groups, with slightly higher values in the LPF group (Table 2). No significant results were found in the mean difference between the groups.

Within-group analysis revealed that only the MI group showed a significant reduction in waist circumference at week 6 compared to week 0 (-1.95). Regarding abdominal circumference, the MI group also demonstrated a significant decrease at week 6 (-1.84) and at week 12 (-1.72) compared to week 0.

Data trends indicated a reduction in waist and abdominal circumference in the LPF group after 6 and 12 weeks. In contrast, the PFMT group showed a decrease in these measurements after 6 weeks but an increase after 12 weeks.

Discussion

This study demonstrated that LPF and PFMT treatments were better than MI in some PFM-related disorders, especially after 12 weeks of treatment. However, significant changes were observed only within the LPF group when comparing evaluation periods.

Discomfort related to PFM disorders

In the present study, the LPF group demonstrated significant improvement in the overall PFBQ score in SUI and DSP after 12 weeks, corroborating the findings of Torres et al.[13] After an eight-week intervention with hypopressive exercises in women aged 18 to 60 years, the authors observed a decrease in symptoms associated with PFMD and a reduction in the severity of UI symptoms. In the study by Torres et al.,[13] the intervention was applied in person and the strength and function of the PFM were assessed by digital palpation with the Modified Oxford Scale. The study also employed questionnaires assessing the perception of discomfort and QoL, specifically the Pelvic Floor Distress Inventory and Pelvic Floor Impact Questionnaire. It is evident that significant results with LPF can be achieved with a 6-week intervention, which is a shorter duration than the study by Torres et al.[13] Notably, with a 12-week intervention, the results become even more pronounced, particularly in the overall PFBQ score, SUI, and DSP.

In a systematic review which aimed to determine whether hypopressive abdominal exercises could be more effective than PFMT, it was concluded that PFMT remains the first-line treatment for PFMD. However, the author highlighted the lack of high-quality clinical trials evaluating the effectiveness of hypopressive abdominal exercises.[14]

A prospective observational cohort study conducted in a university hospital with 105 primiparous women aimed to compare the effectiveness of an eight-week PFMT program versus a hypopressive abdominal technique, utilizing protocols similar to those of the present study but applied in person.[8] Morphological and functional changes were assessed using 3D transperineal ultrasound, manometry, and dynamometry, along with differences in UI symptoms and treatment satisfaction. Both treatments resulted in a statistically significant reduction in UI symptoms.

Perception of quality of life

The intervention groups demonstrated a slight improvement in the perception of QoL, particularly at week 6, although this difference was not significant, and there was a minor decrease at week 12. These results are consistent with the findings of a randomized controlled trial by Sánchez-García et al.,[15] which observed that women who performed LPF during the puerperium experienced improved QoL perception. The authors applied the intervention three times a week and utilized the Health-Related Quality of Life questionnaire,[15] which observed that women who performed LPF during the puerperium experienced improved QoL perception. The authors applied the intervention three times a week and utilized the Health-Related Quality of Life questionnaire Dumoulin et al.,[16] in a systematic review, suggested that women with any type of UI who practice PFMT, compared to a placebo, are more likely to report significant improvements in QoL.

Circumference of waist and abdomen

It was expected that the LPF group would show a significant reduction in waist and abdominal circumferences due to improved postural control and activation of the transversus abdominis from practicing this method.[17] Contrary to expectations, a significant reduction in these circumferences was observed only in the MI group. This outcome may be attributed to the exercise dose administered, as the study involved only one session per week.

Limitations of the study

The small sample size may have affected the results obtained. Uncertainty regarding the return to in-person activities in early 2022 prompted the use of online interventions. However, many postpartum women reported being unable to participate in in-person interventions due to commuting difficulties and the challenges of adapting to a new routine with a newborn. This treatment format may offer broader accessibility for postpartum women with PFMD within the public health system. Additionally, participants declined to undergo in-person assessments of pelvic floor muscle contractions, which can also be considered a limitation of this study.

Internal and external validity

This study was conducted with postpartum women from a public hospital in southern Brazil, and the results should be generalizable to patient groups with similar characteristics. The LPF and PFMT interventions used in the study were well-defined, and the authors are confident that professionals with adequate training could effectively implement these interventions.

Previous systematic reviews have concluded that the efficacy of PFMT and LPF for PFMD remains uncertain due to methodological concerns and the limited number of existing trials. The present study mitigated the primary methodological limitations of previous research by employing a placebo control group and blinded evaluators.

Conclusion

This study demonstrated that discomfort related to PFMD in the postpartum period can be reduced using both PFMT and LPF when applied online. Future studies should evaluate the effectiveness of PFMT and LPF in the recovery of women awaiting surgical procedures for prolapse and urinary incontinence, aiming to remove barriers to women's health in the postpartum period and improve outcomes across different domains of QoL.

Authors' contributions

TMV contributed on the conception and design of the study. ELA was responsible for data collection, which was subsequently analyzed and interpreted by TMV and LMV. RCS and JVO were involved in the implementa-

tion of the interventions. JCG and TMV contributed to the writing of the article and BP conducted the critical review. All authors reviewed and approved the final version of the manuscript.

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