

## The effectiveness of post-partum interventions to prevent urinary incontinence: a systematic review

*Eficácia das intervenções realizadas no pós-parto para prevenir incontinência urinária: revisão sistemática*  
*Eficacia de las intervenciones realizadas en el posparto para prevenir la incontinencia urinaria: revisión sistemática*

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### ABSTRACT

**Objective:** to assess the effectiveness of post-partum interventions to prevent urinary incontinence: a systematic review. **Method:** systematic review of randomized controlled studies conducted in the MEDLINE, Cochrane, Scopus and the Virtual Library on Health (Biblioteca Virtual em Saúde, BVS) databases. **Results:** six articles were included in this review. All studies used the Pelvic Floor Muscle Training as the main procedure to prevent urinary incontinence. The results pointed to a positive and effective intervention in the post-partum period. **Conclusion:** there is evidence that programs of exercise of the pelvic floor musculature performed both in the immediate and late post-partum result in a significant increase in muscle strength and contribute to prevent urinary incontinence. **Descriptors:** Primary Prevention; Effectiveness; Pelvis Diaphragm; Urinary Incontinence; Post-Partum Period.

### RESUMO

**Objetivo:** analisar a eficácia das intervenções realizadas no pós-parto para prevenção da incontinência urinária. **Método:** revisão sistemática de estudos randomizados controlados realizada nas bases de dados MEDLINE, Cochrane, Scopus e Biblioteca Virtual em Saúde - BVS. **Resultados:** seis artigos foram incluídos na revisão. Todos os estudos utilizaram o Treinamento da Musculatura do Assolho Pélvico como intervenção principal para prevenção da incontinência urinária e os resultados das intervenções apontaram para um efeito positivo e eficaz do mesmo no pós-parto. **Conclusão:** há evidências de que programas de exercícios da musculatura do assoalho pélvico realizados tanto no pós-parto imediato quanto no tardio resultam em aumento significativo da força muscular e contribuem para a prevenção da incontinência urinária. **Descritores:** Prevenção Primária; Eficácia; Diafragma da Pelve; Incontinência Urinária; Período Pós-Parto.

### RESUMEN

**Objetivo:** analizar la eficacia de las intervenciones realizadas en el posparto para prevenir la incontinencia urinaria. **Método:** revisión sistemática de estudios aleatorizados controlados, realizada en las bases de datos MEDLINE, Cochrane, Scopus y Biblioteca Virtual en Salud - BVS. **Resultados:** seis artículos fueron incluidos en la revisión. Todos los estudios utilizaron el Entrenamiento de la Musculatura del Piso Pélvico como intervención principal para prevenir la incontinencia urinaria y los resultados de las intervenciones apunta a un efecto positivo y eficaz del mismo en el posparto. **Conclusión:** hay evidencias de que programas de ejercicios de la musculatura del piso pélvico realizados tanto en el posparto inmediato como en el tardío resultan en un aumento significativo de la fuerza muscular y contribuyen a la prevención de la incontinencia urinaria. **Descritores:** Prevención Primaria; Eficacia; Diafragma de la Pelvis; Incontinencia Urinaria; Período Postparto.

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## INTRODUCTION

The prevalence of Urinary Incontinence (UI) greatly varies, mainly according to the type of population and the different age groups. During pregnancy, the prevalence of UI can reach 75.25%<sup>(1)</sup>. In the puerperium rates of 37.9% are noted, even after 12 years of childbirth<sup>(2)</sup>.

Although this is a disease with multiple risk factors<sup>(3)</sup>, studies have shown that most of the dysfunctions of the Pelvic Floor (PF), including UI, are associated with electromyographic signs of denervation of their musculature<sup>(4)</sup>. Vaginal birth is one of the risk factors for this denervation because during the second stage of labor the fetal head can cause compression and elongation of the pudendal nerve, stretching the pelvic tissues and ligaments<sup>(5-6)</sup>. Other studies have also proved that vaginal delivery can decrease the PF muscle strength in primiparous and multiparous women, and when compared to caesarean sections, it is associated with an increased risk of urinary incontinence of effort and urgency<sup>(6-8)</sup>.

The UI in the puerperium may present itself as a transitory situation, resolved within the first three months of post-partum. However, in case the symptoms persist after this period the UI tend to remain in the long term<sup>(9)</sup>, interfering in work, social and sexual life of women, which can negatively impact the quality of life related to health<sup>(10)</sup>.

For this reason, several educational and behavioural interventions tested with the purpose of preventing the women's incontinence after labour<sup>(11)</sup>. Nevertheless, it is necessary to synthesize the evidence available to guide safer clinical decisions. In this context, we ask ourselves: What are the performed interventions during post-partum are effective to prevent urinary incontinence?

## OBJECTIVE

To identify in the literature evidence of the effectiveness of interventions performed in the puerperium for the prevention of urinary incontinence.

## METHOD

### Ethical Aspects

Due to the free access to the studies included in this review, which are not documents that require ethical secrecy, we did not need the evaluation by the Ethics Committee in Research.

### Planning and period of study

Systematic review of the literature, according to the flow-chart by the "Preferred Reporting Items for Systematic Reviews and Meta-Analyses" (PRISMA)<sup>(12)</sup>, including randomized controlled trials with a primary objective of preventing urinary incontinence in postpartum women.

### Inclusion Criteria

Articles available in full in English, Portuguese and Spanish with no limit of publication date. The search was carried out in January and February 2016, in the MEDLINE, Cochrane,

Scopus and Virtual Library on Health (*Biblioteca Virtual em Saúde - BVS*) databases.

### Study protocol

The search strategy was defined through the acronym PICO (Patient, Intervention, Comparison and Outcomes)<sup>(13)</sup> using the Keywords in Health Sciences (KHS) and Medical Subject Heading (MeSH), according to Chart 1.

**Chart 1** – Elements of the PICO strategy and keywords, Brazil, 2016

Component	Definition	Keywords
P: Population of interest	Women in vaginal postpartum with no urinary incontinence.	Postpartum Period; Postnatal Care; Postpartum Care.
I: Intervention	Conservative interventions.	Exercise Therapy; Muscle Strength.
C: Comparison	No treatment; routine treatment of the site of study; combination of other interventions.	No keywords were used.
O: Outcome	Primary: Prevalence of urinary incontinence. Secondary: assessment of the pelvic floor strength; adherence and characteristics of the intervention.	Urinary Incontinence; Stress Urinary Incontinence; Pelvic Floor.

The search was carried out using the following strategies: 1) "Urinary Incontinence" OR "Stress Urinary Incontinence" OR "Pelvic Floor" AND "Postpartum Period" OR "Postnatal Care" OR "Postpartum Car" AND "Exercise Therapy" OR "Muscle Strength"; 2) "Urinary Incontinence" OR "Pelvic Floor" OR "Stress Urinary Incontinence" AND "Postpartum Period" OR "Postnatal Care" AND "Muscle Strength" OR "Exercise Therapy" AND "Intervention Studies"; 3) "Urinary Incontinence" AND "Postpartum Period" AND "Exercise Therapy"; 4) "Pelvic Floor" AND "Postpartum Period" AND "Exercise Therapy"; 5) "Stress Urinary Incontinence" AND "Postpartum Period" AND "Muscle Strength" OR "Exercise Therapy".

Two independent reviewers chose the articles based on the reading of titles, followed by the analysis of abstracts and subsequent appreciation of the full texts of articles and their reference lists, in order to identify studies of potential relevance not found in the electronic search. Possible disagreements during the process were settled by consensus.

### Analysis of results

Data were extracted from the final sample using a standard form of characterization of the study (title, authors, year and publication journal), randomization technique, sample, losses, inclusion and exclusion criteria, postpartum period in which the intervention was performed, type of intervention, technologies used, follow-up time (partial and final) and prevalence of urinary incontinence.

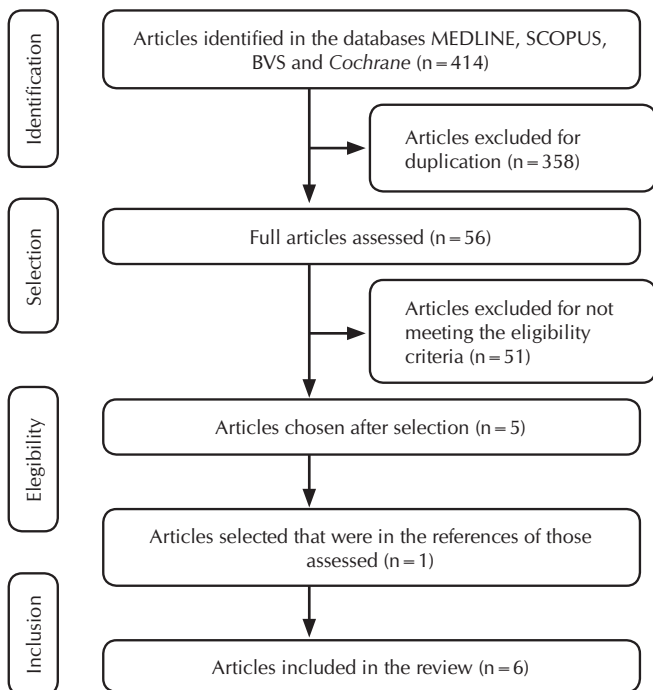
Considering that all interventions evaluated came from randomized clinical trials (RCTs), the Jadad score was used as the

critical evaluation criterion. The Jadad System consists of three topics, directly related to bias reduction (centred on internal validity). All questions have the options yes/no. Its quality score has five points: three times one point for the yes answers and two additional points for appropriate randomization and allocation methods. For the continuity of the critical process, only the RCTs with Jadad score  $\geq 3$  were included, as recommended<sup>(14)</sup>.

The presentation of the results and discussion of the obtained data were made in a descriptive way, focusing on the interventions used, their characteristics and effectiveness evaluation.

## RESULTS

Based on the search strategies and the articles chosen previously presented, 56 studies were included for full reading, five of which were selected to compose the sample. These articles had their references analysed and a study was included in the review, totaling a final sample of six articles. Three of these concerned the same primary study; however, for presenting results of different sampling times they were analysed separately. Although not presenting the UI rates after the intervention, one of the studies assesses the adherence of the puerperal women, which is one of the inclusion criteria of the review at hand (Figure 1).



**Figure 1** – Flowchart of identification and selection of articles for systematic review, Brazil, 2016

### General characteristics and quality of studies

Although a great part of the studies was not characterized as double-blind or did not identify specifications on randomization techniques, all were evaluated as high quality by the Jadad score. As for the sample number, 40 to 1800 participants were included (Chart 2). The techniques of randomization described were the use of an opaque envelope and a drawing.

### Description of interventions

All studies used the Pelvic Floor Muscle Training (PFMT) as the primary intervention compared to usual care. Three of them associated bladder training with the main intervention. Only one study did not describe the use of educational technologies to address the Pelvic Floor (PF) and the PFMT. Two studies have developed ways of reminding the women who gave birth to perform the PF exercises (Chart 2).

The study by Sleep and Grant<sup>(15)</sup> (1987) was the only one to associate the PFMT with usual care. It included instructions on PF exercises, a daily visit of an obstetric physiotherapist still in the ward during the hospitalization, instructions on raising perineal awareness, home visits after discharge with different routines according to their location and an informative flyer on the subject. In addition to the usual care, the intervention group received individual guidance from a physiotherapist with extra daily exercise sessions and a health diary with guidelines on the type of exercise they should perform every week. The exercises were incorporated into the various daily household chores (e.g. while performing activities in the sink or shopping) and illustrated like it was a cartoon. In the first week, exercises characterized as mild should be performed while women went to the bathroom. By the fourth week, they should insert a finger into their vagina in order to feel the pressure of the vaginal muscles. Participants received phone calls reminding them to perform the exercises and were directed to record the performance of the program.

The study by Morkved and Bo<sup>(16)</sup> (2000) included supervised exercises in group sessions of five to ten participants during the duration of the program, plus individual, daily and home exercises without the supervision of a professional. The women of the Control Group (CG) received the usual guidelines written and provided by the hospital and were encouraged to perform pelvic floor exercises on their own.

Chiarelli and Cockburn published three of the seven articles included in this review. The primary study<sup>(17)</sup> describes the intervention with further details. It was conducted in the hospital and happened in two moments. At the first moment, a flyer handed out to the patient with information on UI was discussed, as well as the role of the Pelvic Floor Musculature (PFM), disfunction of the PFM, Pelvic Floor (PF) exercises, proper bladder habits, adequate fluid intake, guidelines to avoid drinking coffee and perineal care.

In the study, women in the CG received an educational flyer prepared by the hospital with post-partum TPFM information along with an invitation to a nurse or physiotherapist consultation. They were not prevented from performing other types of post-partum exercises if they were guided by other professionals.

The study published by the same authors in 2003 brought results on the acceptability of puerperal patients in relation to the proposed exercise program<sup>(18)</sup>, whereas the third study had a follow-up of 12 months after the intervention<sup>(19)</sup>.

Chiarelli, Murphy and Cockburn (2003), when evaluating the acceptability of puerperal women in relation to the pelvic floor muscle exercise program, provided information on drop-out rates, reasons for non-participation, self-reported acceptability, performance and embarrassment at the time of vaginal examination<sup>(18)</sup>.

**Chart 2 – Sample and characteristics of the interventions assessed, Brazil, 2016**

Reference, year and quality of study	Sample (N)	Inclusion Criteria	Intervention performed	Comparison group	Period PP* of the intervention's onset	Frequency and length of the intervention	Duration of protocol	Follow-up time
Sllep; Grant, 1987. Jadad 3.	Initial: 1800 CG <sup>≠</sup> : 900 IG <sup>≠</sup> : 900	Vaginal delivery	TPFM <sup>β</sup> + Usual care	Usual care**	24 hours	As many times as they remembered	4 weeks	Partial: 10 days Final: 3 months
Morkved; Bo, 2000. Jadad 3.	Initial: 198 CG <sup>≠</sup> : 99/IG <sup>≠</sup> : 99 Final: 162 CG <sup>≠</sup> : 81/IG <sup>≠</sup> : 81	Age: 19-40 years old Vaginal or caesarean deliveries Number of children: (1-5 kids)	TPFM <sup>β</sup>	Usual care**	8 weeks	- Once/week - 45 min/session	8 weeks	Partial: 8 weeks Final: 12 months
Chiarelli; Murphy and Cockburn, 2002. Jadad 4.	Initial: 720 CG <sup>≠</sup> : 350/IG <sup>≠</sup> : 370 Final: 654 CG <sup>≠</sup> : 348/IG <sup>≠</sup> : 328	Instrumentalized vaginal delivery and/or Newborns ≥ 4000g	TPFM <sup>β</sup> + Training Bladder	Usual care**	Up to 48 hours	- 3x/day, - Daily	8 weeks	Partial: 8 weeks Final: 3 months
Chiarelli; Murphy and Cockburn, 2003. Jadad 4.	Initial: 720 CG <sup>≠</sup> : 350/IG <sup>≠</sup> : 370 Final: 654 CG <sup>≠</sup> : 348/IG <sup>≠</sup> : 306	Instrumentalized vaginal delivery and/or Newborns ≥ 4000g	TPFM <sup>β</sup> + Training Bladder	Usual care**	Up to 48 hours	- 3x/day, - Daily	8 weeks	Partial: 8 weeks Final: 3 months
Chiarelli; Murphy and Cockburn, 2004. Jadad 4.	Initial: 720 CG <sup>≠</sup> : 350/IG <sup>≠</sup> : 370 Final: 569 CG <sup>≠</sup> : 275/IG <sup>≠</sup> : 294	Instrumentalized vaginal delivery and/or Newborns ≥ 4000g	TPFM <sup>β</sup> + Training Bladder	Usual care**	Up to 48 hours	- 3x/day, - Daily	8 weeks	Partial: 8 weeks Final: 12 months
Assis et al, 2013. Jadad 3.	Initial: 40 CG <sup>≠</sup> :/IG <sup>≠</sup> : without information Final: 23 CG <sup>≠</sup> : 12/IG <sup>≠</sup> : 11	Age (18-35 years old) Number of children (2-4) Post-partum vaginal delivery of fetus at term	TPFM <sup>β</sup>	Usual care**	35 to 40 days of puerperium	- Twice/week - 40 min/session	8 weeks	8 weeks

Note: ≠ Control Group. ≠ Intervention Group; β Training of the Pelvic Floor Musculature; \*PP: post-partum; \*\*Usual care considered those performed as a routine in each study site.

**Chart 3 – Description of the programs of Training the Pelvic Floor Musculature described in the studies, Brazil, 2016**

Study	Number of series	Number of contractions	Characteristics of the contraction	Length of contraction (seconds)	Interval between contractions (seconds)	Positioning during the exercise
Sllep; Grant, 1987.	No information	No information	No information	No information	No information	No information
Morkved; Bo, 2000.	2	8 to 12	Slow	6 to 8	No information	No information
	2	3 to 4	Rapid	No information	No information	No information
Chiarelli; Murphy, 2002; Chiarelli; Murphy and Cockburn, 2003; Chiarelli; Murphy and Cockburn, 2004.	3	6	Slow	3 to 6	No information	No information
Assis et al, 2013.	3	8 to 10	Slow	10	10	Dorsal decubitus lateral and ventral, hands and knees touching the floor, seated and standing.
	3	12 to 16	Slow	20	20	
	3	3 to 5	Rapid	2	6	



The dropout rates among the control and intervention groups were similar, with no significant difference. The main reasons for non-participation were: lack of interest in the subject of the study, being too busy, not wanting exams and living in a distant place. 72.2% of the women reported no embarrassment during the vaginal examination and 22.5% reported experiencing a little embarrassment. The majority of them affirmed that the guidelines received in the study were relevant, with emphasis on information more directed to perineal care and proper bladder and bowel habits. At the eight-week return, 83.9% reported performing TPFM at appropriate frequency<sup>(18)</sup>.

Assis and her colleagues<sup>(20)</sup> (2013) approached puerperal mothers in the maternity ward, scheduling them for a consultation between 35 and 40 days of puerperium, starting the individual exercise program for the PFM. In the first session, a verbal instruction on the PF anatomy, PFM functions and the importance of postpartum exercises for the prevention of Pelvic Floor Disorders (PFD) was performed. Such instruction was performed using pictures of the female anatomy.

Before each exercise session of exercises, a warm-up was conducted, which consisted of stretching the lower limbs and lumbar spine, followed by pelvic mobilization (active anteroversion exercises, pelvic retroversion and pelvic bending). The program alternated slow and rapid contractions, associating them with the contraction of the transverse abdomen muscle, observed through a slight traction of the umbilical scar in the direction of the spine and traction of the waist inwards. The women of the CG did not experience any specific type of pelvic floor care.

### The effectiveness of interventions

The results of the interventions point to the positive and effective effect of TPFM in postpartum, whether immediate or late. Among the forms of effectiveness evaluation, the use of objective measures such as muscle strength evaluation with perineometer and Padtest and subjective, like the evaluation of muscle strength using digital palpation and instruments to measure the presence and degree of urinary losses.

Two studies have brought the muscle strength measured by digital vaginal palpation as a measure of the effect of the TPFM<sup>(16,20)</sup>. In both studies, women were in gynaecological position, with abdomen, pelvic floor and lower limbs naked.

For each method of evaluation of the pelvic floor muscle strength the participant performed three contractions with a one minute interval between one and the other. For the digital vaginal palpation it was considered the contraction that reached the highest value or maximum contraction<sup>(20)</sup>, and the absence of synergistic contractive contraction of adductors, glutes or rectus abdominis was considered as a negative contraction<sup>(16)</sup>.

The digital vaginal palpation was performed with the introduction of the index and middle fingers approximately six centimetres from the vaginal introitus, requiring the contraction of the PFM, of which the strength was classified according to the modified Oxford scale<sup>(20)</sup>.

The synthesis of the primary studies included in the review regarding intervention, the variables measured, conclusions and prevalence of UI after intervention are in Chart 4.

**Chart 4 –** Description of the interventions regarding the variables measured, conclusions and prevalence of urinary incontinence after intervention, Brazil, 2016

Study	Measured variables	Conclusions	Prevalence of UI <sup>β</sup> complaints after the intervention
Sllep; Grant, 1987.	<ul style="list-style-type: none"> <li>• Prevalence and frequency of the UI<sup>β</sup></li> <li>• Prevalence and severity of the perineal pain</li> <li>• Time of resumption of sexual relations</li> <li>• Prevalence of dyspareunia</li> <li>• Prevalence of faecal incontinence</li> <li>• General well-being</li> </ul>	Women in the intervention group were more perseverant with their exercises when evaluated 3 months after the partum. There were no differences between the two groups in terms of frequency or severity of UI <sup>β</sup> , but women in the intervention group were less likely to report perineal pain and feelings of depression 3 months after the partum.	IG <sup>γ</sup> : 22.1% CG <sup>δ</sup> : 22.1% (p > 0.05)
Morkved; Bo, 2000.	<ul style="list-style-type: none"> <li>• Strength of the PFM<sup>α</sup>: -Digital palpation, -Vaginal balloon catheter (to measure the pressure during PFM contractions)</li> <li>• Assessment of urinary loss: -Index of urinary loss measured by a Likert-type scale with 13 types of physical effort with each response ranging from 1 = never to 5 = always, -Padtest.</li> </ul>	The analysis with the paired test of Wilcoxon showed a greater increase in muscle strength (p=0.001) between the 16 <sup>th</sup> week and one year after the partum in the intervention group (Average: 4.4 centimetres H, O; 95% CI 3.2-5.6), than in the control group (Average: 1-7 cm H, O, 95% CI 0.8-2.7). There was a significant difference (p=0.03) in the urinary loss assessed by the Padtest between the intervention and control groups, 16 weeks postpartum and after 12 months of follow up. When comparing the control and intervention groups, 16 weeks after the partum (p<0.05) fewer women in the training group reported urinary loss. The difference was persistent during the 12 months of follow-up.	16 weeks Post-Partum (p = 0.026) IG <sup>γ</sup> : 7.9% (n = 13) CG <sup>δ</sup> : 22.2% (n = 24) 12 months Post-Partum (p = 0.003) IG <sup>γ</sup> : 31% (n = 25) CG <sup>δ</sup> : 38% (n = 31)
Chiarelli; Murphy and Cockburn, 2002.	<ul style="list-style-type: none"> <li>• Evaluation of the presence of urinary losses through a dichotomous outcome, yes or no;</li> <li>• Severity of urinary losses;</li> <li>• Performance in the Exercises</li> </ul>	After 3 months, the two groups differed in relation to the TPFM performance (p=0.001). In the usual care group, 189 women (57.6%) and in the intervention group, 292 women (83.9%) reported TPFM <sup>α</sup> at adequate levels. The TMAP program presented a protective factor for women who participated in the intervention group with a 35% lower chance of developing UI (OR: 0.65 IC: 0.46-0.91; p<0.01).	IG <sup>γ</sup> : 31.0% (n = 108) CG <sup>δ</sup> : 38.4% (n = 125) (p < 0.044)

Continua

Quadro 4 (cont.)

Study	Measured variables	Conclusions	Prevalence of UI <sup>β</sup> complaints after the intervention
Chiarelli; Murphy and Cockburn, 2003.	<ul style="list-style-type: none"> <li>• Global acceptance of the program to promote continence for post-partum women.</li> <li>• Perceived use and utility of program components;</li> </ul>	Most of the women (81.4%) reported having read the flyer and found it quite useful. However, most said that it would be less useful (84.5%) or not useful (5%) if handed out without the advice of the health professional. The dropout rates in the intervention and control groups were the same: intervention group (5.9%) and control group (6.3%).	The prevalence of urinary complaints after the intervention was not measured.
Chiarelli; Murphy and Cockburn, 2004.	<ul style="list-style-type: none"> <li>• Presence of urinary loss after one year of intervention;</li> <li>• Performance of women in the pelvic floor exercises after one year of intervention.</li> </ul>	Although the intervention had not promoted continence at 12 months postpartum when compared to the control group, it appears to have encouraged continued practice of pelvic floor exercises for many women in the intervention group. In order to encourage adherence at a level adequate enough to promote continence at 12 months postpartum it is necessary to consider behavioural principles which will increase the likelihood of behavioural changes being sustained. Ideally, women need feedback and support in the context of PFM assessment provided by a health care provider periodically over and possibly beyond a year postpartum.	3 months: (p < 0.044) IG <sup>γ</sup> : 31.0% (n = 108) CG <sup>δ</sup> : 38.4% (n = 125) 12 months: (p = 0.340) IG <sup>γ</sup> : 34.4% (n = 101) CG <sup>δ</sup> : 36.4% (n = 100)
Assis et al., 2013	<ul style="list-style-type: none"> <li>• Muscle strength using the perineometer and digital palpation;</li> <li>• Urinary symptoms (measured with the ICIQ-SF<sup>1</sup>).</li> </ul>	The exercise program resulted in a significant increase in PFM strength (p < 0.001). There was good correlation in the two evaluations (before and after the intervention) between the vaginal muscle strength measured by digital palpation and by the perineometer (1 <sup>st</sup> evaluation: r = 0.889, p < 0.001; 2 <sup>nd</sup> evaluation: r = 0.925, p < 0.001), indicating that vaginal palpation can be used in clinical practice because it is a low-cost method and demonstrated a significant correlation with an objective method, the perineometer.	IG <sup>γ</sup> : 0% (n = 00) CG <sup>δ</sup> : 25% (n = 03) (p < 0.001)

Note: <sup>β</sup>Urinary Incontinence; <sup>γ</sup>Control Group; <sup>δ</sup>Intervention Group; <sup>ε</sup>Pelvic Floor Musculature; <sup>ζ</sup>Training of Pelvic Floor Muscles; <sup>1</sup>International Consultation Incontinence Questionnaire – Short Form; <sup>\*</sup>UI in the immediate post-partum.

The study using the perineometer (PeritronTM 9300V-Cardio-Design, Australia) to assess the strength of the PFMs performed this assessment after 15 minutes of rest. The vaginal catheter was introduced after being coated with a lubricant-free condom three centimetres from the vaginal introitus<sup>(20)</sup>.

Another study used a vaginal balloon catheter (balloon size 6.7 vs. 1-7 cm) attached to a pressure transducer (CamechLtd, 1300 Sandvika, Norway) to measure vaginal pressure during pelvic floor muscle contractions. Only contractions internally observed were accepted<sup>(16)</sup>.

We also used the Padtest<sup>(16)</sup> as a form of evaluation of the effectiveness of TPFM. In this study, the Padtest was standardized following these steps: after emptying the bladder, women ingested a litre of water within 30 minutes. They would use a heavy absorber previously weighed and jumped up and down for 30 seconds, jumped in alternating abduction and adduction movements with 30 repetitions and coughed three times. After performing the movements the absorber was weighed once more. The cut-off point for a positive Padtest was 2 g.

## DISCUSSION

UI has an increased prevalence among postpartum young women<sup>(8)</sup>, which has prompted investigators to perform interventions during this period to promote urinary continence<sup>(16-20)</sup>. Therefore, health promotion programs that aim to provide information and educate individuals to enable them to make

positive decisions about their lifestyles are useful strategies for achieving good results<sup>(21)</sup>.

The TPFM has been used as an effective option to treat and prevent UI. It has a level A of evidence and is recommended by the Institute of Health Sciences (*Instituto de Ciências da Saúde - ICS*) as the conservative treatment of first choice for women<sup>(22-23)</sup>, which corroborates with the findings of the present review, in which we have verified an improvement in the strength of the PF and lower incidence of UI in CG<sup>δ</sup> from the intervention groups<sup>(16-17,20)</sup>.

It is not clear in what degree can sample selection influence the results found. The study by Morkved and Bo<sup>(16)</sup> (2000) included women with normal and caesarean deliveries, continents and incontinent in the control and intervention groups, and showed improvement in muscle strength and urine loss (p = 0.026). Chiarelle and Murphy<sup>(17)</sup> (2002) (<0.044) and Assis et al<sup>(20)</sup> (2013) (<0.001) more carefully selected the sample, including only puerperal vaginal delivery without UI and found significant results.

Beyond TPFM, behavioural therapy has other components: education, lifestyle modification, bladder training, positive reinforcement and encouragement, and programmed urination<sup>(24)</sup>.

The study by Chiarelle and Murphy<sup>(17)</sup> (2002) who verified a better performance of TPFM in the IG and evidenced the benefit of this practice as a protective effect in relation to UI was based on the health belief model. This model advocates that for the adoption of new behaviours individuals should feel

susceptible to a given condition, have it as an impact factor in their health and believe that the changes adopted will benefit them positively<sup>(25)</sup>. This may have influenced women's lifestyle modification, evidenced by adherence to the intervention and continuous practice 12 months later<sup>(19)</sup>.

The present review demonstrates that some barriers to patient adherence to postpartum TPFM can be overcome with well-delineated interventions. The selection of the interventions to be applied should take into account the specific characteristics of this peculiar moment of the puerperium and ways of sensitizing the woman to the adherence of the training.

Moreover, in relation to the components of behavioural therapy, the study by Silep and Grant<sup>(15)</sup> (1987) strongly reinforced and positively encouraged women to practice TPFM through links made during the study; however, it found no difference in the incidence of UI between the groups. Such a finding may be related to the fact that even the IG performing the intensive TPFM program, the CG also performed TPFM supervised as a routine.

Bladder training was the secondary intervention used in the Chiarelli study; Murphy and Cockburn<sup>(17)</sup> (2002). In this sense, Newman and Wein<sup>(24)</sup> (2013) describe this intervention as an education program that teaches the patient to restore normal bladder function by gradually increasing the intervals between urinations.

The education on the lower urinary tract function, normal urination, healthy bladder habits, bladder training, and healthy life habits may favour adherence to TPFM, since studies by Assis et al<sup>(20)</sup> (2013) and Chiarelli, Murphy and Cockburn<sup>(17)</sup> (2002), who added health information on the subject, showed an improvement in the state of continence of the IG participants.

Regarding the period for performing the TPFM, a study on behavioural therapy in UI brings the period immediately after childbirth as an ideal moment to start training<sup>(24)</sup>. Nevertheless, the findings of the present review point to the benefit of TPFM even when started later<sup>(16,20)</sup>.

Newman and Wein<sup>(24)</sup> (2013) state that TPFM protocols can vary in frequency and quantity and recommend 40 to 60 exercises per day. They also report the use of two types of muscle contractions: fast, lasting on average two seconds, and slow, also known as maximal and sustained, with an average duration of up to ten seconds, concluding that the ideal protocol has not yet been determined.

The studies of Assis et al<sup>(20)</sup> (2013) and Morkved and Bo<sup>(16)</sup> (2000) describe in more details the characteristics of the TPFM program used. However, the program that most approached the recommendations of Newman and Wein<sup>(24)</sup> (2013) was that of Assis et al<sup>(20)</sup> (2013) who used more series of repetitions, with more contractions and longer contraction sustaining time compared to the program by Morkved and Bo<sup>(16)</sup> (2000) and found lower incidence rates of urinary symptoms in the IG when compared to the CG, showing that the more intensive training seems to obtain better results.

The theoretical basis for the exercise of pelvic floor musculature in the treatment and prevention of UI is based on muscle changes that may occur after a specific training of resistance<sup>(23)</sup>. The TPFM involves the direct contracting of PFM in an exercise program specifically designed to increase muscle strength, stamina, speed and coordination<sup>(23)</sup>.

This pelvic floor training assists women to exercise greater control over urinary continence mechanisms by increasing the strength and resistance of paravaginal muscles, increasing urethral pressure, inhibiting detrusor contractions, and preventing urinary loss<sup>(24)</sup>.

At the beginning of each session of the Assis et al<sup>(20)</sup> (2013) study exercise program, a verbal request was made to the women to contract PFMs. The request was associated with digital vaginal palpation. This conduct is considered a verbal biofeedback that refers to the use of various audio-visual techniques that inform the patient about the activity of the striated muscles while trying to control the function of these muscles<sup>(26)</sup>.

In this review, the assessment of the strength of the PFMs performed by digital palpation and the perineometer showed a good correlation<sup>(20)</sup>. Other authors also found similar results when comparing the methods cited in the evaluation of maximum voluntary contraction and muscle strength<sup>(27-28)</sup>. Thus, we believe that digital vaginal palpation can be used in clinical practice to measure the strength of the PFMs, since a significant correlation with the perineometer has been evidenced<sup>(27-28)</sup>.

### Study limitations

Given the objective of the study was to analyse conservative postpartum interventions for UI prevention, we did not use keywords of specific interventions in the search strategy to cover as many interventions as possible. This may have limited the inclusion of other studies in our sample.

### Contributions to the nursing field

The results found in this review can contribute to the practice of nursing by evidencing the characteristics and effectiveness of the interventions performed, directing safer clinical decisions.

### CONCLUSION

There is evidence that pelvic floor muscle training programs performed both in the immediate postpartum and late postpartum periods result in a significant increase in muscle strength and contribute to the prevention of urinary incontinence (level of evidence 2). Adapting the exercise program to the women's routine activities, coupled with visual or telephone reminders, and explanations about the pelvic floor favour adherence to the training program, which is critical to its success.

Exercise programs that use more sets of repetitions, with more contractions and longer contraction sustain time seem to be the most indicated. In addition, it was verified that digital vaginal palpation can be used in clinical practice to measure the strength of the PFMs in the puerperium, since it is a low-cost method with a significant correlation when compared to an objective method (perineometer).

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