Journal of Physiotherapy 64 (2018) 91–96

Journal of PHYSIOTHERAPY

journal homepage: www.elsevier.com/locate/jphys

Research

An education program about pelvic floor muscles improved women's knowledge but not pelvic floor muscle function, urinary incontinence or sexual function: a randomised trial

Roberta Leopoldino de Andrade [a], Kari Bø [b], Flavia Ignácio Antonio [a], Patricia Driusso [c], Elaine Cristine Lemes Mateus-Vasconcelos [a], Salvador Ramos [d], Monica Pitanguy Julio [a], Cristine Homsi Jorge Ferreira [a]

[a] Health Science Department, University of São Paulo, Ribeirão Preto, Brazil; [b] Department of Sports Medicine, Norwegian School of Sports Science, Oslo, Norway; [c] Postgraduate Program in Physiotherapy, Federal University of São Carlos, São Carlos, Brazil; [d] Franca University, Franca, Brazil

KEY WORDS

Pelvic floor
Physical therapy
Knowledge
Health education

ABSTRACT

Question: Does an educational program with instructions for performing 'the Knack' improve voluntary contraction of the pelvic floor muscles, reduce reports of urinary incontinence, improve sexual function, and promote women's knowledge of the pelvic floor muscles? **Design**: Randomised, controlled trial with concealed allocation, intention-to-treat analysis and blinded assessors. **Participants**: Ninety-nine women from the local community. **Intervention**: The experimental group (n = 50) received one lecture per week for 4 weeks, and instructions for performing 'the Knack'. The control group (n = 49) received no intervention. **Outcome measures**: The primary outcome was maximum voluntary contraction of the pelvic floor muscles measured using manometry. Secondary outcomes were: ability to contract the pelvic floor muscles measured using vaginal palpation; severity of urinary incontinence measured by the International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF) scored from 0 to 21; self-reported sexual function; and knowledge related to the pelvic floor. Outcomes were measured at baseline and after 4 weeks. **Results**: The intervention did not significantly improve: maximum voluntary contraction (MD 2.7 cmH_2O higher in the experimental group, 95% CI −0.5 to 5.9); ability to contract the pelvic floor muscles (RR 2.18, 95% CI 0.49 to 9.65); or self-reported severity of urinary incontinence (MD 1 point greater reduction in the experimental group, 95% CI −3 to 1). Sexual function did not significantly differ between groups, but very few of the women engaged in sexual activity during the study period. The educational program did, however, significantly increase women's knowledge related to the location, functions and dysfunctions of the pelvic floor muscles, and treatment options. **Conclusion**: Education and teaching women to perform 'the Knack' had no significant effect on voluntary contraction of the pelvic floor muscles, urinary incontinence or sexual function, but it promoted women's knowledge about the pelvic floor. **Trial registration**: Brazilian Registry of Clinical Trials, RBR-95sxqv. **[de Andrade RL, Bø K, Antonio FI, Driusso P, Mateus-Vasconcelos ECL, Ramos S, Julio MP, Ferreira CHJ (2018) An education program about pelvic floor muscles improved women's knowledge but not pelvic floor muscle function, urinary incontinence or sexual function: a randomised trial. *Journal of Physiotherapy* 64: 91–96]**

Introduction

Literature has indicated that there is a worldwide lack of knowledge among women regarding pelvic floor dysfunctions and treatment options.[1–4] Urinary incontinence is a prevalent condition among women of all ages and has a considerably negative effect on quality of life.[2–5] Latin American women are especially undereducated in relation to urinary incontinence, treatment options and access to treatment.[6]

Strength training of the pelvic floor muscles (PFM) has been shown to be effective in treating urinary incontinence, and is recommended as first-line treatment.[7] Proper instructions for performing PFM contractions is considered crucial to being able to perform PFM training.[8] One idea about how PFM training may be effective in the prevention and treatment of urinary incontinence is to teach women to contract their pelvic floor muscles before and during activities that cause increased intra-abdominal pressure.[8,9] This type of contraction, called 'the Knack' by Miller et al,[10] reduced urinary leakage when a group of women were instructed to cough as hard as they could. However, it is unclear whether teaching women to contract their PFM before and during different activities of daily life improves their maximum voluntary contraction (MVC) and lessens urinary incontinence symptoms and complaints over time. It may be helpful because increasing awareness of PFM function decreases symptoms in various pelvic floor disorders and increases quality of life.[11]

Educational programs about the PFM can include information about PFM function, dysfunction and options for treatment. For

https://doi.org/10.1016/j.jphys.2018.02.010

women in the community, these programs can facilitate the search for treatment, especially conservative options.[3] However, little is known about the impact of an educational program in combination with instructions for women to perform 'the Knack' on PFM function, urinary incontinence, sexual function and women's knowledge related to the pelvic floor.

Therefore, the aims of this randomised trial were to answer the following questions:

1. Does participation in an educational program with instructions for performing 'the Knack' allow women from the community to improve MVC of their PFM?
2. Does the program enable women with no voluntary PFM contraction to do so?
3. Does the program reduce women's reports of urinary incontinence, improve their sexual function, and increase their pelvic floor knowledge?

Method

Design

An assessor-blinded, randomised, controlled trial was conducted with concealed allocation, assessor blinding, and intention-to-treat analysis. Women who expressed interest in participating received verbal and written information, and gave their informed consent before being allocated to a group and before their baseline assessment. Randomisation was performed using computer-generated random numbers to allocate participants to either an experimental group or a control group. A secretary who was not involved with recruitment randomised the eligible participants, who were informed by phone about their group allocation.

Participants, therapists, centres

The study participants were women who: were living in the local community; were aged $\geq$ 18 years; had never received physiotherapy for pelvic floor dysfunction; and agreed to participate in the study. Exclusion criteria were pelvic organ prolapse greater than Grade 2 on the Pelvic Organ Prolapse Quantification grading system,[12] or any intolerance or discomfort to PFM examination. The study was advertised by posters in the coverage area of the health centre, including the primary care health centres. An assistant researcher not involved with assessments and interventions helped to publicise the project and recruit participants in different locations in the neighbourhood.

The educational program was conducted in a community health centre in Ribeirão Preto, Brazil. The intervention was delivered by internship physiotherapy students in their fifth year of their course. All educational sessions were supervised by two teachers with 20 and 17 years of experience in women's health physiotherapy.

Intervention

The participants allocated to the experimental group attended an educational program, consisting of four 90-minute lectures offered once a week during 1 month at the community health centre. The lectures included demonstrations of PFM anatomy, function and dysfunction using illustrations, and discussions about risk factors and treatment options available for pelvic floor disorders. The program emphasised how to correctly perform pelvic floor contractions, and promoted PFM awareness. The participants were instructed to contract their PFM during different tasks of daily life that increase intra-abdominal pressure, such as coughing, sneezing, lifting and other physical activities. The education sessions had a maximum number of 10 participants, in order to allow discussions about the topics and interaction between participants. The team that delivered the program was not involved in assessing or analysing the results.

Participants allocated to the control group received no intervention and were not contacted during the 4-week intervention period.

Outcomes measures

Study outcome measures were obtained at baseline and after 4 weeks for participants in both groups. A brief explanation of PFM function and how to perform a muscle contraction were given to all participants before the assessment. All PFM measurements were performed by the same physiotherapist, who had 9 years of experience in women's health physiotherapy.

Primary outcome

The primary outcome was the pressure generated during a MVC of the PFM, which was assessed using a commercial manometer[a]. The manometer measured vaginal squeeze pressure in cmH_2O through a conical sensor covered with a medical silicone rubber sheath. The sensor was placed with the middle of the probe 3.5 cm inside the vagina. The device was zeroed and participants were asked to perform three MVCs with a 10-second rest interval between each contraction.[13] Women were instructed to contract their PFM as strongly as they could and to relax as soon as they felt they had performed their MVC. The peak value (highest pressure achieved) of each contraction was registered in cmH_2O. Only contractions with visible inward movement of the perineum were considered valid.[14,15] The mean of three MVCs was used in the analysis. Women who were unable to perform a correct contraction were not excluded from the study, because the study was intended to evaluate whether their ability to contract would change. However, only participants able to perform a correct PFM contraction were assessed using manometry.

The manometer[a] is reported to be a highly reliable method of measurement,[16] with the manufacturer reporting that 95% of readings are correct to ± 1 cmH_2O. The manometer also has high intra-rater reliability for MVC measurement.[17]

Secondary outcomes

The ability to perform a correct PFM contraction was assessed using vaginal palpation before manometry measurement.[11] A correct PFM contraction was defined as an inward movement and squeeze around the urethra, vagina and rectum.[14,15]

Symptoms of urinary incontinence were assessed using a validated self-report questionnaire: the International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF).[18] This questionnaire has been translated into Brazilian Portuguese, culturally adapted and validated in this language.[19] It consists of four questions aimed at assessing the frequency of urinary incontinence, its perceived cause, and its impact on quality of life. The severity and impact of urinary incontinence on quality of life was measured using the total score of the ICIQ-SF (sum of the scores of questions one, two and three). The range of possible scores on this instrument varies from 0 to 21, where higher scores indicate greater severity.

The prevalence of reports of urinary incontinence in both groups was assessed using the first question of the ICIQ-SF. Women were considered continent if they answered 'never' to the first question, which asks about frequency of urinary incontinence.

Sexual function was assessed using a validated self-report questionnaire: the Female Sexual Function Index (FSFI).[20,21] This is a 19-item, self-reported questionnaire evaluating six domains of women's sexual function in the past 4 weeks. The full scale score is obtained by adding the domain scores. The total score ranges between 2 and 36, with higher scores indicating better sexual function. Individual domain scores were obtained by adding the scores of the items that comprise each domain and multiplying the sum by the domain factor. The full scale score was obtained by adding the domain scores.

Knowledge of the pelvic floor was assessed using a questionnaire developed for this study. Women were first asked if they had heard about PFM before, and then they answered four questions related to pelvic floor knowledge: 'Where are the pelvic floor muscles located?', 'What are the pelvic floor muscles' functions?', 'What are the main pelvic floor dysfunctions?' and 'What are the options for treatment of pelvic floor dysfunctions?'. Guidelines/consensus of the International Continence Society were used to determine whether the answers were correct or not.[22]

Data analysis

An a priori power analysis was performed to estimate the number of participants needed to obtain statistical power of 0.80 at an alpha level of 0.05. Based on a pilot sample, we sought to power the study to identify an anticipated difference between the groups of 4.9 cmH_2O, anticipating a mean peak value change of 5.6 cmH_2O for Group 1 and 0.7 cmH_2O for Group 2. The anticipated SD from the pilot data was 7.3 cmH_2O. Using a Student's bilateral *t*-test, the minimum sample size required was 29 participants per group. We planned to include about 50% more participants in order to get MVC data for at least 29 participants. This was done to account for possible sample loss of up to 20% and for the anticipated 24 to 29% of participants who would not be able to contract their PFM,[23,24] making it unfeasible to measure MVC.

Descriptive statistics were calculated and tabulated to characterise the participants. For the comparison of two means, Student's *t*-tests were used. To verify association between qualitative variables, the Fisher's exact test was used. In addition, the quantification of the association was measured using logistic regression models where the relative risk was calculated with its respective 95% CI. The McNemar test was used to verify changes in categories before and after the intervention. A linear mixed-effect model was used for the analysis of the MVC and ICIQ-SF score. For the MVC analysis, we imputed the lowest value of the sample at a scheduled assessment point for any participant who was unable to perform a PFM contraction at that time. In the reassessment, values of individuals were considered as random effects, and the groups, the times and the interaction between them were considered as fixed effects. The Wilcoxon-Mann-Whitney test for independent samples was used to analyse sexual function data. The significance level adopted for all tests was 5%.

Results

Compliance with trial protocol

Among the 50 participants in the experimental group, 46 (90%) participated in all four meetings, two (4%) missed one meeting, and two (4%) did not attend any of the scheduled meetings. No adverse effects were reported by participants in the intervention group. No control group participants attended the sessions.

Flow of participants through the trial

The flowchart (Figure 1) shows the trial profile and the number of dropouts in each group. For all outcome measures at the two established time points, 48 participants in the intervention group and 45 participants in the control group were assessed, except where noted below.

At baseline, the groups were similar with regard to: MVC; ability to contract the PFM; prevalence of urinary incontinence; severity and impact of urinary incontinence on quality of life (ICIQ-SF scores); sexual function (FSFI scores); and knowledge of the PFM. The baseline data are presented in Table 1.

Effect of intervention

Primary outcome

At Week 4, the experimental and control groups did not significantly differ in the average amount of pressure generated during a MVC (MD 2.7 cmH_2O higher in the experimental group, 95% CI −0.5 to 5.9) (Table 2). Individual participant data are presented in Table 3 (see eAddenda for Table 3).

Secondary outcomes

At Week 4, four (36%) of the 11 participants in the experimental group who had been unable to contract their PFM at Week 0 showed the capacity to contract their PFM. In the control group, two (12%) of the 17 participants who had been unable to contract their PFM at Week 0 showed the capacity to contract their PFM after intervention. The intervention, therefore, did not significantly increase the recovery of this ability (RR 3.09, 95% CI 0.68 to 14.11).

No significant between-group difference was found for prevalence of urinary incontinence, as reported using the ICIQ-SF. Similarly, the groups did not significantly differ in the percentage

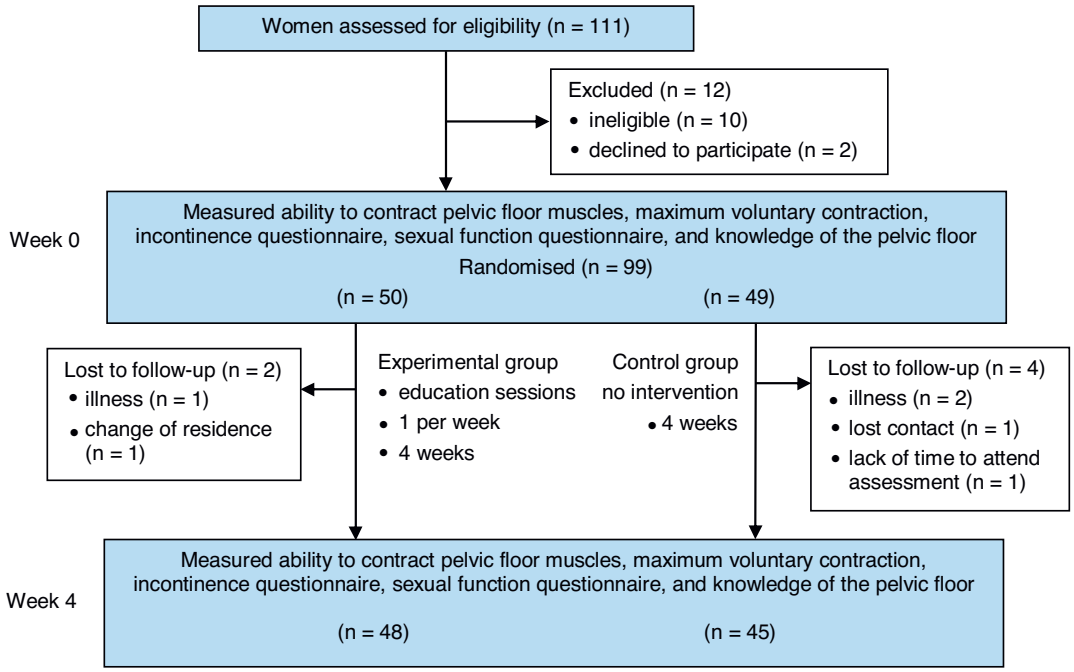

Figure 1. Design and flow of participants through the trial.

Table 1
Baseline characteristics of the study completers.

Characteristic	Exp (n = 48)	Con (n = 45)
Age *(yr)*, mean (SD)	58 (13)	57 (11)
Number of births, n (%)		
0	6 (13)	1 (2)
≥ 1	42 (88)	44 (98)
Mode of delivery, n (%)[a]		
normal birth	19 (45)	20 (45)
caesarean section	12 (29)	16 (36)
normal birth + caesarean section	11 (26)	8 (18)
Body mass index, n (%)[b]		
normal	11 (24)	9 (20)
overweight	19 (41)	19 (42)
obese	16 (35)	17 (38)
Formal education, n (%)		
no education	2 (4)	4 (9)
up to 8 years	24 (50)	20 (44)
8 to 11 years	17 (35)	17 (38)
> 11 years	5 (10)	4 (9)
Marital status, n (%)		
single	6 (13)	1 (2)
married/cohabiting	25 (52)	28 (62)
divorced	7 (15)	8 (18)
widow/widower	10 (21)	8 (18)
Maximum voluntary contraction *(cmH_2O)*, mean (SD)	30 (21)	30 (26)
Ability to contract the PFM, n (%)	37 (77)	33 (73)
Prevalence of UI, n (%)[c]	37 (77)	27 (61)
ICIQ-SF score *(0 to 21)*, mean (SD)[c]	8 (7)	7 (7)
Previous knowledge of the PFM, n (%)	18 (38)	22 (49)

Exp = experimental group, Con = control group, SD = standard deviation, PFM = pelvic floor muscles, UI = urinary incontinence, ICIQ-SF = International Consultation on Incontinence Questionnaire-Short Form.
Some percentages do not sum to 100, due to the effects of rounding.
[a] n = 42 Exp and 44 Con.
[b] n = 46 Exp.
[c] n = 44 Con.

of participants who reported that urinary incontinence occurred with the specific causes nominated in the ICIQ-SF. These data are reported in Table 4. The severity and impact of urinary incontinence on quality of life, as reflected in the ICIQ-SF total score, also did not significantly differ between the groups, as presented in Table 5. Individual participant data are presented in Table 3 (see eAddenda).

Few data could be collected regarding sexual function because at Week 0, only 12 (12%) of the participants stated that they had had sexual activity in the prior 4 weeks and agreed to complete the FSFI questionnaire. These 12 participants comprised five (10%) out of 50 in the experimental group and seven (14%) out of 49 in the control group. At Week 4, one participant from the experimental group did not repeat the questionnaire. Change in scores for the remaining 11 participants were analysed but no significant between-group differences arose on any of the domains or on the total score. Because of the limited data, these results are presented on the eAddenda, with the analyses in Table 6 and the individual participant data in Table 3.

The intervention caused greater acquisition of knowledge about the PFM in the experimental group compared to the control group. This was evident as statistically significant between-group differences in knowledge for all four of the aspects of the PFM that were assessed (ie, location, function, dysfunction, and

Table 4
Number (%) of participants in each group reporting urinary incontinence and reporting each perceived cause of urinary incontinence on the International Consultation on Incontinence Questionnaire-Short Form questionnaire at Week 4, and the relative risk (95% CI) between groups.

Outcome	Groups		Relative risk between groups
	Exp (n = 48)	Con (n = 44)	Exp relative to Con
Reports urinary incontinence	26 (54)	26 (59)	0.92 (0.64 to 1.31)
Before reaching the toilet	16 (62)	21 (81)	0.70 (0.42 to 1.16)
When coughing or sneezing	19 (40)	16 (36)	1.09 (0.64 to 1.84)
When asleep	5 (10)	3 (7)	1.53 (0.39 to 6.02)
When active or exercising	10 (20)	13 (30)	0.71 (0.34 to 1.44)
After urinating and dressed	6 (13)	11 (25)	0.50 (0.20 to 1.24)
No obvious reason	7 (15)	7 (16)	0.92 (0.35 to 2.40)
All the time	1 (2)	0 (0)	−0.02 [a] (−0.11 to 0.06)

Con = control group, Exp = experimental group.
[a] Relative risk is not calculable, due to zero value so absolute risk reduction is reported.

treatment options), as presented in Table 7. Individual participant data are presented in Table 3 (see eAddenda).

Discussion

The educational program investigated in this study showed no significant effect on the MVC, the ability of participants to contract their PFM, complaints of urinary incontinence, or sexual function, compared with an untreated control group. It is important to emphasise that the participants in this study were not diagnosed with urinary incontinence or referred for physiotherapy; they were recruited from the community to participate in the study. About half of the participants had a low educational level profile comparable to 88% of the Brazilian population and 78% of women living in Ribeirão Preto City.[25] However, the educational program that was evaluated was effective in providing knowledge related to the pelvic floor for this sample of women. Previous studies have indicated the benefits of informing women about PFM function, dysfunction, and options for treatment.[1,11] These benefits include increased chances of women seeking care, reduction of pelvic floor dysfunction symptoms, improvement in quality of life, and a better adherence to conservative treatments such as PFM training.[1,11] Specific programs with this focus may be useful in a public health context to inform the general population of women in Brazil about pelvic floor dysfunction and options for treatment. However, it cannot replace appropriate specific PFM training interventions for treatment of urinary incontinence.[7] Future studies should investigate the possible impact of such programs on women's ability to seek care and in global healthcare related to pelvic floor dysfunction.

The experimental group was instructed to perform PFM contractions (the 'Knack'), not only before and during coughing, but also during any activities involving increased intra-

Table 2
Mean (SD) of groups, mean (SD) difference within groups, and mean (95% CI) difference between groups for maximum voluntary contraction (cmH_2O) of the pelvic floor muscles.

Outcomes	Groups				Difference within groups		Difference between groups
	Week 0		Week 4		Week 4 minus Week 0		Exp minus Con
	Exp (n = 48)	Con (n = 45)	Exp (n = 48)	Con (n = 45)	Exp (n = 48)	Con (n = 45)	
Maximum voluntary contraction *(cmH_2O)*	29.5 (20.8)	30.2 (25.6)	34.0 (22.1)	32.1 (25.1)	4.5 (8.1)	1.8 (7.3)	2.7 (−0.5 to 5.9)

Con = control group, Exp = experimental group.
Apparent discrepancies are due to rounding of decimal places.

Table 5
Mean (SD) of groups, mean (SD) difference within groups, and mean (95% CI) difference between groups for the severity and impact of urinary incontinence on quality of life, as measured by the International Consultation on Incontinence Questionnaire-Short Form total score.

Outcomes	Groups				Difference within groups		Difference between groups
	Week 0		Week 4		Week 4 minus Week 0		Exp minus Con
	Exp (n = 48)	Con (n = 44)	Exp (n = 48)	Con (n = 44)	Exp (n = 48)	Con (n = 44)	
ICIQ-SF *(0 to 21)*	8 (7)	7 (7)	6 (6)	6 (6)	−2 (5)	−1 (5)	−1 (−3 to 1)

Con = control group, Exp = experimental group, ICIQ-SF = International Consultation on Incontinence Questionnaire-Short Form.

abdominal pressure. These instructions did not lead to any between-group differences in the MVC, the ability to contract the PFM, the reported prevalence of urinary incontinence, or the severity and impact of urinary incontinence on quality of life. Previous studies investigating this manoeuvre have found it to be effective in reducing urinary leakage in selected samples of women with stress or predominant stress urinary incontinence, and not in general samples of women from the community.[10] The original study by Miller et al[10] included only women with mild to moderate urinary incontinence who were individually taught how to perform the manoeuvre using vaginal palpation. The participants were instructed to perform a strong cough in order to quantify the urine leakage using the paper towel test. After 1 week there was a significant reduction in urinary leakage during cough. The intervention used in the present study was only educational and based on instructions given to groups with up to 10 participants. In contrast to the Miller study,[10] there was no significant reduction in the prevalence of women complaining of urine leakage in the educational group of our study. This result suggests that the selection of patients with stress or predominant stress urinary incontinence and individual instructions from physiotherapists may be necessary for 'the Knack' to be effective.

The study by Miller et al[10] did not find any difference in PFM strength. However, this was not expected after only 1 week of intervention. Using intensive supervised PFM training, Bø et al[15] showed a 100% increase in muscle strength after 1 month of intervention. Other studies have found a significant increase in PFM activity and MVC after 3 weeks to 1 month of PFM training, with or without associated electrical stimulation.[26–28] All of those studies did, however, include individual follow-up by a physiotherapist. The results of the present study indicate that the acquisition of knowledge related to the pelvic floor and instructions for performing PFM contractions before and during daily life activities involving increased abdominal pressure were not enough to significantly improve MVC in a 1-month period. We cannot be sure that the results would not be different if the assessment period after the end of the intervention was longer or if a longer intervention period was used. However, a randomised, controlled trial conducted by Brækken et al[29] compared 6 months of 'the Knack' with strength training offered to women with pelvic organ prolapse and found no effect of teaching 'the Knack' on strength, endurance, or prolapse. The aim of the present study was to investigate a short intervention to see if it could be useful in a primary care context for women from the community. For ethical reasons, all women identified as having urinary incontinence complaints received instructions for performing an evidence-based protocol of PFM training and a referral to a urogynaecologist at the end of the study period, independent of the intervention they were allocated for the study.

Table 7
Number (%) of participants in each group responding correctly to questions about the pelvic floor at Week 4, and the relative risk (95% CI) between groups.

Outcome	Groups		Relative risk between groups
	Exp (n = 47)	Con (n = 43)	Exp relative to Con
PFM location	41 (87)	26 (60)	1.44 (1.11 to 1.88)
PFM functions	42 (89)	17 (40)	2.26 (1.54 to 3.31)
PFM dysfunctions	40 (85)	12 (28)	3.05 (1.86 to 5.00)
Treatment options	43 (91)	10 (23)	3.93 (2.27 to 6.82)

Con = control group, Exp = experimental group, PFM = pelvic floor muscles.

Although PFM seem to play a role in sexual function, the female sexual response is influenced by several other variables.[30,31] Although the present study did not find any between-group differences in sexual function, the analysis was impaired by the small number of participants who answered the sexual function questionnaire, which limited conclusions related to this question and indicated the need for future studies specifically designed for this purpose.

In Brazil, there are no specific national programs to inform women about pelvic dysfunction, and the waiting list for consultation with a specialist can be long.[32] Primary healthcare providers are generally not prepared to deal with pelvic floor dysfunction or to actively search for or address these problems.[33] For these reasons, any educational program aiming to inform the general population of women about pelvic floor dysfunction would attract a high number of women with this dysfunction. There is no simple solution for this complex problem, but studies have indicated that the starting point should be information.[1,11] One randomised trial showed an increase in pelvic floor knowledge and a decrease in pelvic floor dysfunction in a selected sample of office workers after 2 months of an educational intervention associated with PFM training.[11] Considering the high prevalence of untreated women with PFM dysfunction worldwide, it seems worthwhile from a public health standpoint to further investigate the feasibility and cost-effectiveness of offering educational programs associated with PFM training to the general population of women at a primary care level. The results of the present study do not support any effect on urinary incontinence when a 1-month educational program with instructions for women to perform 'the Knack' is provided, although the program was effective in increasing women's PFM knowledge.

The present study had some limitations. The period of follow-up was only to the end of the intervention period. Adherence to instructions to contract the PFM before and after daily life activities that cause increased intra-abdominal pressure was not monitored on a daily basis using a diary. At every weekly meeting, however, the participants were reminded to continue exercising and they confirmed that they were performing the manoeuvre at home. This information was given to the researchers who administered the intervention and not to the blinded assessors. Urinary incontinence was not a primary outcome of this study, and it was evaluated using only a self-reported outcome measure; nevertheless, the ICIQ-SF is a reliable and valid instrument.[17] Despite these limitations, strengths of the current study were its design, minimal loss to follow-up, use of blinded assessors, and use of reliable tools to evaluate MVC and reports of urinary incontinence.

The present study seems to be the first randomised, controlled trial in the literature indexed on PubMed to investigate the impact

of a 1-month educational program in combination with instructions for performing 'the Knack.' The long-term cost-effectiveness of educational programs on PFM dysfunction should be a priority in larger randomised trials in the future.

In summary, this study identified that a 1-month educational program combined with instructions for women to perform 'the Knack' had no effect on MVC, ability to contract the PFM, reports of urinary incontinence, or sexual function. However, it was effective in increasing women's knowledge related to PFM location, function, dysfunction, and options for treatment.

What is already known on this topic: Training the pelvic floor muscles increases how strongly they can contract, reduces the prevalence of urinary incontinence, and seems to improve sexual function in women with urinary incontinence. When women with mild to moderate urinary incontinence are given individual instructions to perform 'the Knack' manoeuvre during strong coughing, urine loss is reduced. In addition, women's knowledge of the pelvic floor muscles seems to be associated with less pelvic floor muscle dysfunction.

What this study adds: An educational program consisting of four meetings to teach women about pelvic floor (dys)function and to instruct them in how to perform the 'Knack' did not strengthen the maximal voluntary contraction of the pelvic floor muscles, improve ability to contract the pelvic floor muscles correctly, or reduce urinary incontinence complaints. The program did, however, increase women's knowledge related to the pelvic floor.

Footnotes: [a] Peritron, Cardio-Design, Australia

eAddenda: Tables 3 and 6 can be found online at https://doi.org/10.1016/j.jphys.2018.02.010

Ethics approval: The Ethics Committee of the Health Center of the Ribeirão Preto Medical School, University of São Paulo (CSE-FMRP-USP) (Register CEP/CSE-FMRP-USP 895.278) approved this study. All participants gave written informed consent before data collection began.

Competing interest: Nil.

Source of support: We acknowledge the grant from National Council for Scientific and Technological Development (CNPq) – Universal 484630/2011-3 and the Scholarship from São Paulo Research Foundation – FAPESP 09/52771-5.

Acknowledgements: Nil.

Provenance: Not invited. Peer reviewed.

Correspondence: Cristine Homsi Jorge Ferreira, Rehabilitation and Functional Performance, Ribeirão Preto Medical School, University of São Paulo, Ribeirão Preto, Brazil. Email: cristine@fmrp.usp.br

References

1. Mandimika CL, Murk W, McPencow AM, Lake A, Wedderburn T, Collier CH, et al. Knowledge of pelvic floor disorders in a population of community-dwelling women. *Am J Obstet Gynecol.* 2014;210:165.e1–165.e9.
2. Neels H, Wyndaele JJ, Tjalma WA, De Wachter S, Wyndaele M, Vermandel A. Knowledge of the pelvic floor in nulliparous women. *J Phys Ther Sci.* 2016;28:1524–1533.
3. Hill AM, McPhail SM, Wilson JM, Berlach RG. Pregnant women's awareness, knowledge and beliefs about pelvic floor muscles: a cross-sectional survey. *Int Urogynecol J.* 2017;28:1557–1565.
4. Caagbay DM, Black K, Dangal G, Raynes-Greenow C. Can a leaflet with brief verbal instruction teach Nepali women how to correctly contract their pelvic floor muscles? *J Nepal Health Res Counc.* 2017;15:105–109.
5. Dieter AA, Wilkins MF, Wu JM. Epidemiological trends and future care needs for pelvic floor disorders. *Curr Opin Obstet Gynecol.* 2015;27:380–384.
6. Sevilla C, Wieslander CK, Alas AN, Dunivan GC, Khan AA, Maliski SL, et al. Communication between physicians and Spanish-speaking Latin American women with pelvic floor disorders: a cycle of misunderstanding? *Female Pelvic Med Reconstr Surg.* 2013;19:90–97.
7. Dumoulin C, Hay-Smith EJC, Mac Habée-Séguin G. Pelvic floor muscle training versus no treatment, or inactive control treatments, for urinary incontinence in women. *Cochrane Database Syst Rev.* 2014;5:CD005654.
8. Bø K. Pelvic floor muscle training is effective in treatment of female stress urinary incontinence, but how does it work? *Int Urogynecol J Pelvic Floor Dysfunct.* 2004;15:76–84.
9. Bø K, Sherburn M. Evaluation of female pelvic-floor muscle function and strength. *Phys Ther.* 2005;85:269–282.
10. Miller JM, Ashton-Miller JA, DeLancey JO. A pelvic muscle precontraction can reduce cough-related urine loss in selected women with mild SUI. *J Am Geriatr Soc.* 1998;46:870–874.
11. Berzuk K, Shay B. Effect of increasing awareness of pelvic floor muscle function on pelvic floor dysfunction: a randomized controlled trial. *Int Urogynecol J.* 2015;26:837–844.
12. Persu C, Chapple CR, Cauni V, Gutue S, Geavlete P. Pelvic Organ Prolapse Quantification System (POP-Q) - a new era in pelvic prolapse staging. *J Med Life.* 2011;4:75–81.
13. Friedman S, Blomquist JL, Nugent JM, McDermott KC, Muñoz A, Handa VL. Pelvic muscle strength after childbirth. *Obstet Gynecol.* 2012;120:1021–1028.
14. Kegel AH. Stress incontinence and genital relaxation; a nonsurgical method of increasing the tone of sphincters and their supporting structures. *Ciha Clin Symp.* 1952;4:35–51.
15. Bø K, Hagen RH, Kvarstein B, Larsen S. Pelvic floor muscle exercise for the treatment of female stress urinary incontinence: II. Validity of vaginal pressure measurements of pelvic floor muscle strength and the necessity of supplementary methods for control of correct contraction. *Neurourol Urodyn.* 1990;9:479–487.
16. Rahmani N, Mohseni-Bandpei MA. Application of perineometer in the assessment of pelvic floor muscle strength and endurance: A reliability study. *J Bodyw Mov Ther.* 2011;15:209–214.
17. Frawley HC, Galea MP, Phillips BA, Sherburn M, Bo K. Reliability of pelvic floor muscle strength assessment using different test positions and tools. *Neurourol Urodyn.* 2006;25:236–242.
18. Avery K, Donovan J, Peters TJ, Shaw C, Gotoh M, Abrams P. ICIQ: a brief and robust measure for evaluating the symptoms and impact of urinary incontinence. *Neurourol Urodyn.* 2004;23:322–330.
19. Tamanini JT, Almeida FG, Girotti ME, Riccetto CL, Palma PC, Rios LA. The Portuguese validation of the International Consultation on Incontinence Questionnaire Vaginal Symptoms (ICIQ-VS) for Brazilian women with pelvic organ prolapse. *Int Urogynecol J Pelvic Floor Dysfunct.* 2008;19:1385–1391.
20. Rosen R, Brown C, Heiman J, Leiblum S, Meston C, Shabsigh R, et al. The Female Sexual Function Index (FSFI): a multidimensional self-report instrument for the assessment of female sexual function. *J Sex Marital Ther.* 2000;26:191–208.
21. Pacagnella e, Martinez EZ, Vieira EM. Construct validity of a Portuguese version of the Female Sexual Function Index. *Cad Saude Publica.* 2009;25:2333–2344.
22. Haylen BT, de Ridder D, Freeman RM, Swift SE, Berghmans B, Lee J, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. *Int Urogynecol J.* 2010;21:5–26.
23. Kandadai P, O'Dell K, Saini J. Correct performance of pelvic muscle exercises in women reporting prior knowledge. *Female Pelvic Med Reconstr Surg.* 2015;21:135–140.
24. Vermandel A, De Wachter S, Beyltjens T, D'Hondt D, Jacquemyn Y, Wyndaele JJ. Pelvic floor awareness and the positive effect of verbal instructions in 958 women early postdelivery. *Int Urogynecol J.* 2015;26:223–228.
25. Instituto Brasileiro De Geografia E Estatística (IBGE). Estatísticas de gênero. 2010. Available at: http://www.ibge.gov.br/apps/snig/v1/?loc=0&cat=-1,2,-2,-13,48,128&ind=4699. [Accessed 28 July 2016].
26. Domoulin C, Seaborne DE, Quirion-DeGirardi C, Sullivan SJ. Pelvic floor rehabilitation, part 1: Comparison of two surface electrode placements during stimulation of the pelvic-floor musculature in women who are continent using bipolar interferential currents. *Phys Ther.* 1995;75:1067–1074.
27. Turkana A, Yuksel I, Fazli D. The short-term effects of physical therapy in different intensities of urodynamic stress incontinence. *Gynecol Obstet Invest.* 2005;59:43–48.
28. Batista RLA, Franco MM, Naldoni LMV, Duarte G, Oliveira AS, Ferreira CHJ. Biofeedback and the electromyographic activity of pelvic floor muscles in pregnant women. *Rev Bras Fisioter.* 2011;15:386–392.
29. Braekken IH, Majida M, Engh ME, Bø K. Can pelvic floor muscle training reverse pelvic organ prolapse and reduce prolapse symptoms? An assessor-blinded, randomized, controlled trial. *Am J Obstet Gynecol.* 2010;203:170.e1–170.e7.
30. De Menezes Franco M, Driusso P, Bø K, Carvalho de Abreu DC, da Silva Lara LA, de Sá Rosa E, et al. Relationship between pelvic floor muscle strength and sexual dysfunction in postmenopausal women: a cross-sectional study. *Int Urogynecol J.* 2017;38:931–936.
31. Ferreira CH, Dwyer PL, Davidson M, De Souza A, Ugarte JA, Frawley HC. Does pelvic floor muscle training improve female sexual function? A systematic review. *Int Urogynecol J.* 2015;26:1735–1750.
32. Araújo GTB. O custo da incontinência urinária no Brasil-experiência do serviço de Uroginecologia da UNIFESP. São Paulo. Dissertação (Mestrado em ciências). Universidade Federal de São Paulo; 2009. http://repositorio.unifesp.br/handle/11600/9848.
33. Delarmelindo RCA, Parada CMGL, Rodrigues RAP, Bocchi SCM. Between suffering and hope: rehabilitation from urinary incontinence as an intervening component. *Ciênc saúde coletiva.* 2013;18:1981–1991.