International Urogynecology Journal (2019) 30:1903–1909
https://doi.org/10.1007/s00192-018-3824-y

ORIGINAL ARTICLE

Pelvic floor muscle knowledge and relationship with muscle strength in Brazilian women: a cross-sectional study

Leticia Maciel de Freitas[1] · Kari Bø[2] · Ana Carolina Nociti Lopes Fernandes[1] · Natalia Uechi[1] · Thaiana Bezerra Duarte[1] · Cristine Homsi Jorge Ferreira[1,3]

Received: 9 August 2018 / Accepted: 9 November 2018 / Published online: 22 November 2018

Abstract

Introduction and hypothesis There seems to be little knowledge about pelvic floor muscles (PFMs) in the general population; however, literature confirming this assertion is scarce, especially in developing countries. The present study hypothesized a low level of knowledge about PFMs in a sample of Brazilian women and a positive relationship between that knowledge and the ability to contract the PFMs, strength, and urinary continence.

Methods This was a cross-sectional study including 133 women. A questionnaire assessing knowledge about PFMs and the International Consultation on Incontinence Questionnaire-Short Form (ICIQ-UI-SF) were applied. Vaginal palpation and manometry were used to assess PFM condition. Pearson's correlation coefficient was used to test the association between PFM knowledge and continuous variables, and Fisher's exact test was used to compare the women's PFM knowledge with the categorical variables.

Results A low level of PFM knowledge was observed in this sample, with a mean total score of 0.48 (±0.97). Vaginal manometry peak, mean, and duration values were 39.1 cmH_2O (±23.7), 25.5 cmH_2O (±16.1), and 21.1 s (±20.8) respectively. The ICIQ-UI-SF mean score was 7.1 (± 6.8). There were weak correlations between PFM knowledge and age (r −0.2044/ $p = 0.01$), and parity (r −0.19568/$p = 0.02$). PFM knowledge was higher among women with higher education levels ($p = 0.0012$) and those who had previously performed PFM training ($p < 0.001$).

Conclusion The participants showed a low level of PFM knowledge. No relationship between PFM knowledge and ability to contract or prevalence of UI was observed.

Keywords Pelvic floor · Muscle function · Urinary incontinence

Introduction

There seems to be little knowledge about the pelvic floor muscles (PFMs) and their functions, dysfunction, and treatment options among the general female population [1–4]. This lack of knowledge seems to impair women's ability to search for health care, reducing their chances of receiving adequate treatment for pelvic floor dysfunctions [5, 6].

Urinary incontinence (UI) is the most prevalent PFM-related dysfunction. It affects women of various ages and has a great impact on quality of life [5, 7]. Although pelvic floor muscle training (PFMT) has level 1 A evidence of being effective in the treatment of female stress UI (SUI) and mixed UI (MUI), it seems that a large number of women have no knowledge about the different treatment options for this condition [1, 2, 8–10].

Even when women with UI have access to PFMT, it is considered important to offer instruction about PFM anatomy, functions, dysfunctions, options for treatment, and prognosis, to allow them to acquire realistic expectations of treatment, optimizing the results and their satisfaction with them [3, 11, 12]. Knowledge is also considered one modifying factor of PFMT adherence [13].

Abstract was presented at the XXII Brazilian Congress of Physiotherapy

✉ Cristine Homsi Jorge Ferreira
cristine@fmrp.usp.br

[1] Postgraduate Program in Rehabilitation and Functional Performance, Department of Health Science, Ribeirão Preto Medical School, University of São Paulo, Ribeirão Preto, SP, Brazil

[2] Department of Sports Medicine and Akershus University Hospital, Norwegian School of Sport Sciences, Lørenskog, Norway

[3] Universidade de São Paulo, Av. Bandeirantes, 3900 Monte Alegre, Ribeirão Preto, SP 14049-900, Brazil

Studies investigating women's knowledge about the pelvic floor have been mostly conducted in developed countries with samples of women with higher education levels [1, 2, 4, 9]. Nevertheless, most of these studies have indicated limited knowledge about pelvic floor anatomy, PFM functions, PFM-related dysfunction, and PFMT. There have been no studies assessing the relationships between general knowledge of the PFMs and the ability to contract the muscles, strength, and UI reports [1, 2, 4]. The present study was aimed at assessing the level of knowledge about PFMs of a sample of Brazilian women and the relationships between PFM knowledge and the ability to contract the PFMs, PFM strength, and the prevalence of UI.

Materials and methods

Design

This was a cross-sectional study performed at the Joel Domingos Machado School Health Center, Ribeirão Preto, Brazil. The study was approved by the Ethics Committee of the Joel Domingos Machado School Health Center at Ribeirão Preto Medical School, University of São Paulo (CSE-FMRP-USP) ID 043/2016. Recruitment and data collection took place between January 2016 and October 2017.

Participants

A total of 160 women were recruited for the study. Inclusion criteria were: age ≥ 18 years; being literate; living in the city of Ribeirão Preto, São Paulo, Brazil; coming to the health care center either as a patient or a companion; not being pregnant or being more than 12 months postpartum; and having no neurological or psychiatric diseases. Exclusion criteria were intolerance or discomfort with PFM assessment.

A pilot study of 21 women was conducted to determine the sample size. Based on an estimated difference in PFM strength of 6.5 cmH2O, a standard deviation of 15.6 cmH2O, a significance level of 0.05, and a test power of 80%, a minimum sample of 122 participants was estimated.

After recruitment, the researcher informed the women about the research procedures, checked the eligibility criteria, and invited them to participate. Once they had agreed to participate, the women answered a questionnaire on background variables, knowledge about PFMs, pelvic floor dysfunction, treatment options, and reports of urinary incontinence. A physical therapist with 4 years of clinical experience in the area of women's health and pelvic floor dysfunction performed all the assessments. We followed the terminology recommended by the International Urogynecological Association (IUGA)/International Continence Society (ICS) [14].

Outcome measures

The women first answered a questionnaire on background variables containing obstetric history, anthropometric information, and living habits. Women who reported any physical activities such as walking, jogging, or swimming for 30 min at least three times per week were classified as being physically active.

Primary outcome

To evaluate knowledge of the PFMs, a questionnaire was developed by the Research Group of the Laboratory for Pelvic Floor Functional Evaluation (LAFAP) [15]. The questionnaire includes five questions. The women were first asked if they had ever heard about the PFMs, and then they answered four open questions related to pelvic floor knowledge.

Participants could speak freely, and the researcher responsible took note of the exact words used. The questionnaire was analyzed in two ways:

1. Considering a score per question ranging from 0 to 1 and a total summed score of 4. Table 1 shows how the answers were classified; the closer to the maximum score, the better the knowledge about the PFMs.
2. Considering a score of 0 or 1, with 0 representing no knowledge about the PFMs and 1 representing any knowledge.

Questions on the PFM knowledge questionnaire, possible answers, and scores are shown in Table 1.

Secondary outcomes

After application of the PFM knowledge questionnaire, the participants answered the International Consultation on Incontinence Questionnaire on Urinary Incontinence-Short Form (ICIQ-UI-SF). This is a condition-specific quality of life questionnaire that has been translated and validated for the Portuguese language [16]. It is composed of four questions; the sum of the first three questions gives the score, and the fourth describes the type of UI [16]. The total possible score on the questionnaire is 21, and the higher the score, the worse the severity and inconvenience of the urinary incontinence. All questionnaires were delivered to participants by one assistant researcher, who was not involved with PFM assessment. Ability to contract the PFMs was assessed by another researcher, who was blinded in relation to the results of the questionnaires.

Ability to perform a correct PFM contraction was assessed by bidigital vaginal palpation. First, the women were given thorough individual instructions on how to contract the muscles properly, using figures and a pelvic model. Correct PFM

Table 1 Questions on the pelvic floor muscle (PFM) knowledge questionnaire, possible answers, and score

Question	Possible answers	Score
1. What is the anatomical location of the PFMs?	It is a located inside the pelvis, muscles surrounding the vagina or something located down here (pointing to the lower part of the pelvis)	1.0
2. What are the functions of the PFMs?	Voluntary and involuntary contraction generating inward movement of the perineum	0.2 each
	Pelvic organ support	
	Maintenance of urinary and anal continence	
	Related to sexual function	
	Allowing childbirth	
3. What are the main dysfunctions of the pelvic floor?	Urinary incontinence	0.2 each
	Sensory symptoms of the lower urinary tract	
	Pelvic organ prolapse symptoms	
	Sexual dysfunction	
	Anorectal symptoms	
4. What are the treatment options for pelvic floor dysfunction?	Pelvic floor muscle training	0.33 each
	Pharmacological treatment	
	Surgical treatment	
Total score		4

contraction was explained as a squeeze around the vaginal opening, and a lift of the perineum. The evaluation of the ability to perform a correct PFM contraction was performed with the women in the supine position with knees and hips in a flexed and abducted position, and with their feet on the bench. All evaluations were performed by the same examiner. The voice command given to all participants during the examination to contract their PFMs was: "squeeze my fingers and lift as if you were holding urine."

The modified Oxford Grading Scale was used to quantify PFM strength during vaginal palpation [17]. The participants attempted maximum contractions three times. The modified Oxford Grading Scale has been tested for reliability and the intra-tester reliability for muscle strength has been found to be good in the supine position, with Kappa values of 0.69–0.78 [18, 19].

In addition, vaginal manometry (Peritron ™; Cardio-Design, Australia) was used to quantify PFM strength and endurance, except in participants who presented scores 0 or 1 on the modified Oxford Grading Scale. Assessment using the Peritron has shown an intra-class correlation value in the supine position of 0.91 and 0.42 for PFM strength and PFM endurance respectively [18].

The examiner inserted the probe covered with a non-lubricated condom and water-based gel. Only 1 cm of the vaginal probe was left outside the vagina. The women were instructed to perform PFM contractions as close to maximum as possible. Three maximum contractions were requested with rest intervals of 30 s between contractions. Peak and mean values were recorded in cmH_2O and duration in seconds. Only contractions with a visual inward movement of the probe were recorded as correct contractions [20].

Data analysis

All statistical analyses were performed using the statistical software SAS 9.4. The normal distribution of data was analyzed using the Shapiro–Wilk test. Background variables are presented as means with a standard derivation (SD) or frequencies and percentages.

Pearson's correlation coefficient was used to test the association between PFM knowledge and age, BMI, peak, mean, and PFM endurance and total ICIQ-UI-SF score. Spearman's correlation coefficient was used to analyze PFM knowledge and parity.

Fisher's exact test was used to compare the women's PFM knowledge in relation to marital status, ethnicity, educational level, parity, mode of delivery, prevalence of UI, and whether or not the women were doing PFMT. Values of $p \leq 0.05$ were considered statistically significant.

Results

A total of 160 women were recruited and 133 women were eligible for the study. Table 2 presents the background characteristics of the sample. Most of the women were white, married, had up to 11 years of education,

Table 2 Characterization of the study sample. Means with standard deviation (SD) and numbers with percentages (%)

Variables		(*N* = 133)
Mean age years (SD)		53.3 (13.8)
Mean weight, kg (SD)		71.5 (16.1)
Mean height, m (SD)		1.6 (0.1)
Mean BMI, (SD) (kg/m^2)		28.6 (6.3)
Marital status *n* (%)	Married	73 (54.9)
	Single	23 (17.3)
	Divorced	16 (12)
	Widowed	21 (15.8)
Self-reported ethnicity *n* (%)	White	84 (63.2)
	Black	15 (11.3)
	Other	34 (25.6)
Years of education *n* (%)	< 8 years	65 (48.8)
	8–11 years	49 (36.8)
	> 12 years	19 (14.3)
Occupation	Unemployed	4 (3)
	Employed	58 (43.6)
	Retired	15 (11.3)
	Student	5 (3.7)
	Housewife	51 (38.3)
Being physically active ≥30 min ≥ 3 days per week	Yes	50 (37.6)
	No	83 (62.4)
Parity *n* (%)	Nulliparous	14 (10.5)
	Primiparous	12 (9)
	Multiparous	107 (80.5)
Mode of delivery *n* (%)	Cesarean	51 (38.3)
	Vaginal	82 (61.6)
Number of vaginal births *n* (%)	0	51 (38.4)
	1	18 (13.5)
	≥ 2	64(48.1)
Urinary incontinence *n* (%)	Absent	50 (37.6)
	Present	83 (62.4)
Women who have heard about PFMs *n* (%)	Yes	56 (41.1)
	No	77 (57.9)
Women who have performed PFMT *n* (%)	Yes	10 (7.5)
	No	123 (92.5)

SD standard deviation, *BMI* body mass index, *PFMs* pelvic floor muscles, *PFMT* pelvic floor muscle training

$p \leq 0.05$

were employed, and were multiparous, and had had more than two vaginal births. Most had urinary incontinence, but had never performed PFMT.

Table 3 presents the number of women with and without PFM knowledge for each question of the questionnaire and the score for PFM knowledge for each question. Most of the women presented no PFM knowledge, and those with some PFM knowledge had low overall scores.

The vaginal palpation examination revealed that 9% of the women presented as grade 0 according to the modified Oxford Grading Scale, and 14.4% presented as grade 1. Most women (35.3%) presented as grade 2. Grade 3 was observed in 21.8% of the sample, and grade 4 in 13.5%. Six percent of the sample were able to perform a PFM contraction of grade 5.

Among women with scores of 2–5 on the modified Oxford Grading Scale, the mean and SD of peak strength was 39.1 cmH_2O (23.7), mean strength 25.5 cmH_2O (16.1), and endurance 21.1 s (20.8).

The mean ICIQ-UI-SF score was 7.1 (SD 6.8). Of the 133 women, 83 (62.4%) reported having UI, among whom 16 (19.3%) reported urgency urinary incontinence, 26 (31.3%) stress urinary incontinence, 32 (38.5%) mixed urinary incontinence, 2 (2.4%) continuous urinary incontinence, and 2 (2.4%) loss of urine without an obvious reason. Of the 83 women, 12 (14.5%) reported nocturnal enuresis and 20 (24.1%) postmicturition leakage.

No knowledge about the PFMs was stated by 54 women (40.6%) who were able to perform a correct PFM contraction, whereas 19 women (14.3%) who had no knowledge about PFMs were unable to correctly contract the PFMs. Some knowledge about PFMs was declared by 48 women (36.1%) who were able to perform a correct PFM contraction, whereas 12 women (9%) who declared that they have some knowledge were unable to contract their PFMs.

No knowledge about the PFMs was stated by 46 women (34.6%) who were incontinent and by 27 (20.3%) who were continent. Of women who had some knowledge about PFMs, 23 (17.3%) were continent and 37 (27.8%) were incontinent.

Table 4 presents data on the correlations between PFM knowledge score and age, PFM strength and endurance, and ICIQ-UI-SF total score. There were statistically significant weak negative correlations between knowledge of the PFMs and age. There was a statistically significant weak negative correlation between PFM knowledge and parity (−0.18; p = 0.03).

Table 5 presents PFM knowledge according to categorical variables. Statistically significant differences were observed in relation to years of education and previous practice of PFMT.

Discussion

The present study investigated the level of knowledge about the PFMs in a sample of Brazilian women. The population studied had some knowledge about the PFMs, but the quality of this knowledge was poor. Also investigated were the relationships between the level of PFM knowledge and the ability to contract the PFMs and reports of urinary incontinence. No relationships were found between PFM knowledge, ability to contract the PFMs, PFM strength, and UI. Statistically significantly weak negative correlations were found between PFM

Table 3 Participants' knowledge (1) or nonknowledge (0) of PFM anatomical location, functions, and dysfunction related to this musculature, treatment options, and the quantification of their knowledge, presented as a score for each question and the total score

Question ($N = 133$)	Overall score (n/%)		Score (mean/SD)
	1	0	
What is the anatomical location of the PFMs?	32 (24.1)	101 (75.9)	0.24 (0.4)
What are the functions of the PFMs?	27 (20.3)	106 (79.7)	0.07 (0.2)
What are the main dysfunctions of the pelvic floor?	34 (25.6)	99 (74.4)	0.07 (0.1)
What are the treatment options for pelvic floor dysfunctions?	31 (23.3)	102 (76.7)	0.1 (0.2)
Total	60 (45.1)	73 (55)	0.48 (1)

knowledge and age and parity, and there were statistically significant associations between knowledge and years of education and previous PFMT.

Two studies conducted in Belgium included heterogeneous samples of nulliparous, peripartum, and postmenopausal women and found little knowledge about the pelvic floor [1, 2]. Most women expressed concern about pelvic floor dysfunction. Although there was a lack of knowledge, most of their samples knew the striated–skeletal muscle composition of the pelvic floor and were able to locate it on an image of the female human body. Additionally, almost three-quarters of the participants could mention at least one function of the PFMs, and one-quarter, more than one function [1, 2]. Other studies have confirmed relatively limited knowledge about the PFMs in samples of highly educated women in developed countries [4, 9]. The women in these studies had more advanced knowledge compared with the sample in the present study, which is to be expected considering the lower levels of education of the sample. In general, the literature agrees with this finding, showing a positive association between pelvic floor knowledge and higher educational levels [9, 21].

In the present study, only 23% of the participants were able to indicate at least one option for the treatment for pelvic floor dysfunctions. There is a scarcity of studies investigating PFM knowledge among women with low to moderate levels of education. Research conducted in the United States assessed knowledge of UI and POP among elderly American–Indian women to assess barriers to seeking treatment for pelvic floor dysfunctions [22]. The women in the study sample had levels of education similar to those in the present study, and the results showed that almost 50% of the participants believed that the use of pads and surgery were the only treatment options for urinary incontinence [22]. A qualitative study with focus groups conducted in the USA identified the need of Spanish-speaking Latina women for more information regarding pelvic floor disorders, although they had a basic understanding about pelvic organs and functions [23].

Table 4 Correlations between the PFM knowledge score and age, vaginal manometry, ICIQ-UI-SF, and parity

Variable	Pearson's coefficient (p value)*
Age	**−0.2 (0.01)***
Vaginal manometry	
Peak	0.04 (0.7)
Duration	−0.02 (0.8)
Mean	0.05 (0.6)
ICIQ-UI-SF score	0.03 (0.7)

ICQ-SF International Consultation on Incontinence Questionnaire-Short Form

*$p \leq 0.05$

Similar to the present study, Dunivan et al. [22] found a weak correlation between increasing age and low level of knowledge about urinary incontinence ($r = -0.2$, $p = 0.02$). This may be explained by the greater ability of younger women to search for information online [24]. No studies were found that assessed correlations between PFM knowledge and previous PFMT, ability to contract the PFMs, and PFM strength. The present study found a positive correlation between previous PFMT and PFM knowledge. It is reasonable to assume that women who have previously performed PFMT have received more in-depth and specific information about the PFMs. The absence of correlations between the ability to contract the PFMs and PFM strength and PFM knowledge observed in the present study may be related to the low level of PFM knowledge in the sample.

Unfortunately, this study could not assess further correlations using different classifications of PFM knowledge such as high versus no knowledge. This occurred because the mean PFM knowledge of our sample was extremely low, limiting further correlations. However, some of the sociodemographic and educational characteristics of our sample are comparable with about 87.5% of the Brazilian population and 78% of women living in the city of Ribeirão Preto [25]. The data from the present study could be cautiously generalized to similar populations with medium and low educational levels in other countries. Considering these population characteristics, the present study indicates an urgent need to implement educational strategies at the government level to disseminate PFM knowledge to women. Such educational strategies could increase the demand for low-complexity care, reducing the high costs related to surgical and

Table 5 Results of Fisher's exact test considering variables and knowledge about PFMs

Variables associated with knowledge about PFMs	PFM knowledge, *n* (%)		*P* value*
	No	Yes	
Marital status			
Married	41 (30.8)	32 (24.1)	0.2
Single	10 (7.5)	13 (9.8)	
Divorced	7 (5.3)	9 (6.8)	
Widowed	15 (11.3)	6 (4.5)	
Years of education			
< 8 years	44 (33.1)	21 (15.8)	**<0.00***
> 8 years	29 (21.8)	39 (29.4)	
Vaginal birth			
With vaginal birth	49 (36.8)	33 (24.8)	0.2
With no vaginal birth	24 (18.1)	27 (20.3)	
Being physically active ≥30 min, ≥ 3 days per week			
Yes	23 (17.3)	27 (20.3)	0.15
No	50 (37.6)	33 (24.8)	
Performed PFMT previously			
Yes	0 (0)	10 (7.5)	**<0.00***
No	73 (54.9)	50 (57.6)	
Ability to contract the PFMs			
Yes	54 (40.6)	48 (36.1)	0.5
No	19 (14.3)	12 (9)	
UI			
Yes	46 (34.6)	37 (27.8)	1.0
No	27 (20.3)	23 (17.3)	

PFMs pelvic floor muscles, *PFMT* pelvic floor muscle training

*$p \leq 0.05$

pharmacological treatment. Future cost-effectiveness studies should investigate this important issue.

A possible limitation of the present study is the use of a nonvalidated questionnaire to assess women's knowledge about the PFMs. However, to date, there have been no validated tools available in Portuguese, although there is more than one in English [1, 2, 4, 22]. Other studies have also used nonvalidated structured questionnaires developed by the authors [11, 21]. The questionnaire developed for the present study was shown to be simple and easy to understand by the study sample; future studies should further validate it in samples with a variety of socioeconomic profiles.

Although the present study does have the above limitations, it appears to be the first to explore the association between PFM knowledge and PFM function. Future studies with more heterogeneous samples of women are warranted.

Conclusion

The participants showed a low level of PFM knowledge. No relationships between PFM knowledge and the ability to contract or prevalence of UI were observed.

Compliance with ethical standards

Conflicts of interest None.

References

1. 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(5):1524–33.
2. Neels H, Tjalma WA, Wyndaele JJ, De Wachter S, Wyndaele M, Vermandel A. Knowledge of the pelvic floor in menopausal women and in peripartum women. J Phys Ther Sci. 2016;28(11):3020–9.
3. Liao YM, Dougherty MC, Liou YS, Tseng J. Pelvic floor muscle training effect on urinary incontinence knowledge, attitudes, and severity: an experimental study. Int J Nurs Stud. 2006;43(1):29–37.
4. 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(6):837–44.
5. Shah AD, Massagli MP, Kohli N, Rajan SS, Braaten KP, Hoyte L. A reliable, valid instrument to assess patient knowledge about urinary incontinence and pelvic organ prolapse. Int Urogynecol J. 2008;19(9):1283.
6. Kiyosaki K, Ackerman AL, Histed S, Sevilla C, Eilber K, Maliski S, et al. Patient understanding of pelvic floor disorders: what women want to know. Female Pelvic Med Reconstr Surg. 2012;18(3):137.

7. Almousa S, Van Loon AB. The prevalence of urinary incontinence in nulliparous adolescent and middle-aged women and the associated risk factors: a systematic review. Maturitas. 2018;107:78–83.
8. Dumoulin C, Hay-Smith J, Habée-Séguin GM, Mercier J. Pelvic floor muscle training versus no treatment, or inactive control treatments, for urinary incontinence in women: a short version Cochrane systematic review with meta-analysis. Neurourol Urodyn. 2015;34(4):300–8.
9. O'Neill AT, Hockey J, O'Brien P, et al. Knowledge of pelvic floor problems: a study of third trimester, primiparous women. Int Urogynecol J. 2017;28(1):125–9.
10. Woodley SJ, Boyle R, Cody JD, Mørkved S, Hay-Smith EJC. Pelvic floor muscle training for prevention and treatment of urinary and faecal incontinence in antenatal and postnatal women. Cochrane Database Syst Rev. 2017;10:CD007471.
11. Smith AL, Nissim HA, Le TX, et al. Misconceptions and miscommunication among aging women with overactive bladder symptoms. Urology. 2011;77(1):55–9.
12. Doshani A, Pitchforth E, Mayne CJ, Tincello DG. Culturally sensitive continence care: a qualitative study among south Asian Indian women in Leicester. Fam Pract. 2007;24(6):585–93.
13. Hay-Smith J, Herderschee R, Dumoulin C, Herbison P. Comparisons of approaches to pelvic floor muscle training for urinary incontinence in women: an abridged Cochrane systematic review. Eur J Phys Rehabil Med. 2012;48(4)689–705.
14. Bø K, Frawley HC, Haylen BT, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for the conservative and nonpharmacological management of female pelvic floor dysfunction. Int Urogynecol J. 2017;28(2):191–213.
15. De Andrade RL, Bø K, Antonio FI et al. 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. J Physiother. 2018;64(2):91–6.
16. Tamanini JTN, Almeida FG, Girotti ME, et al. The Portuguese validation of the International Consultation on Incontinence Questionnaire—Vaginal Symptoms (ICIQ-VS) for Brazilian women with pelvic organ prolapse. Int Urogynecol J. 2008;19(10):1385–91.
17. Laycock J, Jerwood D. Pelvic floor muscle assessment: the PERFECT scheme. Physiotherapy. 2001;87(12):631–42.
18. Frawley HC, Galea MP, Phillips BA, Sherburn M, Bø K. Reliability of pelvic floor muscle strength assessment using different test positions and tools. Neurourol Urodyn. 2006;25(3):236–42.
19. Navarro Brazález B, Torres Lacomba M, de la Villa P, et al. The evaluation of pelvic floor muscle strength in women with pelvic floor dysfunction: a reliability and correlation study. Neurourol Urodyn. 2008;37(1):269–77.
20. Bø K, Kvarstein B, Hagen RR, 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(5):479–87.
21. 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(10):1557–65.
22. Dunivan GC, Komesu YM, Cichowski SB, Lowery C, Anger JT, Rogers RG. Elder American Indian women's knowledge of pelvic floor disorders and barriers to seeking care. Female Pelvic Med Reconstr Surg. 2015;21(1):34.
23. Jackson E, Hernandez L, Mallett VT, Montoya TI. Knowledge, perceptions, and attitudes toward pelvic organ prolapse and urinary incontinence in Spanish-speaking Latinas. Female Pelvic Med Reconstr Surg. 2017;23(5):324–8.
24. AlGhamdi KM, Almohedib MA. Internet use by dermatology outpatients to search for health information. Int J Dermatol. 2011;50(3):292–9.
25. Instituto brasileiro de geografia e estatística–IBGE. Atlas do censo demográfico 2010. Rio de Janeiro: IBGE; 2013.