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Social networks and physical therapy in Women's Health

As redes sociais e a fisioterapia na Saúde da Mulher

Andrea Marques

I am from the generation who followed computers and cell phones being built. My undergraduate thesis to conclude my physiotherapy studies was typed, so if we made a little edictoring mistake it would mean to re-writing the entire page or using an indiscreet corrector, evidencing our misspelling. This is to explain that from 1987 onwards, it seems that I have moved to Marte. Nevertheless, I am fascinated by technology.

With the outbreak of the COVID-19 pandemic, all my concerns regarding distance courses, video-services, online classes, and everything regarding the digital world went down the drain and the internet gained my respect. Internet is here (or already has been) to stay, and the benefits that such resources are able to bring, updating professionals and bringing them closer to patients, are indisputable.

Pressured by students and colleagues, I discreetly joined social networks. I have Instagram and Facebook, which I think is already too much, considering that I don't post anything and my investments in this navigation are usually related to following an event, seeing photos of a wedding and birthday of loved ones, or snippets of songs and cooking recipes.

But my Instagram, this one I decided would be purely professional. Through Instagram I am able to follow former students and professional colleagues promoting their services and achievements, and I imagine how good this is for the visibility and dissemination of clinics, services and how people need to know each other so that patients can reach them. But every now and then, something bothers me about these disclosures. Words, or vulgarized postures, exposing professionals and services. Some of them I even know and they are good in what they do. But this type of publication brings physical therapy, specifically the area of Women's Health, into a dangerous place. The impression I have is that the more "different" the post is, the more interest it arouses among the public. I wonder what the evolution of all of this will achieve. I have a feeling that there are no limits or control.

We have worked for 30 years to make Physical therapy in Women's Health a respectable and scientific area, to come out from ostracism and conquer its place that consists in a very rich field and with huge potential to be developed. It has to have some way to take care of these advertisements. I wish it occurs in a careful, respectful way, reaching patients and professionals in an almost delicate manner. We must venerate our profession. It has survived to wars,[1] pandemics, status and power fights, but it keeps growing. It had solid foundations and is operated by science and by professionals who dedicate their lives to this very beautiful career of being a physical therapist.

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Andrea Marques is a physical therapist graduated from PUC-Campinas, having earned her master´s and PhD from UNICAMP, and post-doctorate from the University of British Columbia, Canada. She was responsible for the Physiotherapy Service of CAISM/UNICAMP from 2000 to 2009 and is one of the authors of the book *Tratado de Fisioterapia em Saúde da Mulher*.

Correspondence: andreamarquesfisio@hotmail.com

Physical therapy in women's health: reeducation in coloproctology

Fisioterapia na saúde da mulher: reeducação coloproctológica

Silvana Uchôa

Physical therapy in women's health is one of the areas of physical therapy that has grown most in the recent years in Brazil and in the world; This advance is due to the association of scientific evidence with professional ethics. Its performance in the field of coloproctology has been increasing and this is due to the effectiveness that physical therapy approaches have demonstrated over time, associated with a better understanding of the physiological mechanisms of continence and defecation.

Furthermore, it is noteworthy that this also results from a clinical diagnosis by physicians and a well-prepared and precise functional kinetic diagnosis by physical therapists. In this sense, it can be said that due to the progress of techniques for exploring the intestinal and anorectal physiology, associated with the recordings of anorectal pressures, rectal compliance study, defecography and electromyography of the pelvic floor muscles (PFMs), a more accurate medical diagnosis and more effective physical therapy treatment became possible.[1]

Reeducation in coloproctological physical therapy comprises a group of procedures that are used to help regain control of the neuromuscular function of the perineal lumbar-pelvic complex and sphincteric muscles, integrating them to the functional activities of daily life. We cannot fail to mention that this re-education must include treatment from a biopsychosocial point of view and be based on the International Classification of Functioning, Disability and Health (ICF). For a better understanding of the goals and effects of therapeutic resources used in the reeducation of the bowel and anorectal complex, we must, in addition to have knowledge of anatomy, anorectal physiology and PFMs, as well as a deep learning of the biophysical and biological properties of the resources used in the therapeutical approaches.[2]

The pelvic floor is composed of a muscle complex that is housed within the pelvic bones and has three main functions; defecation, urination and sexual function. Most dysfunctions consist of anal incontinence, and dyssynergic defecation, which can occur in isolation or associated with structural problems, such as rectal prolapse, rectal mucosa intussusception, solitary rectal ulcer syndrome, rectocele, enterocele, which are promoters of obstructed defecation. As well as other disorders such as descending perineum syndrome and anorectal pains, since they all contribute to evacuation impairment and promote a significant impact on quality of life.[3,4]

Among all procedures used in the treatment of anorectal dysfunctions, it is important to mention behavioral therapy that is described as a group of specific interventions with low cost whose objective is to modify

the relationship between the signs and symptoms presented by the patient and his environment. This can be obtained by means of behavior and/or environment changes in which the individual is found. Emphasizing that biofeedback is considered a behavioral therapy, and presents levels of evidence in anal incontinence (Level II, Grade B) and dyssynergic defecation (Level I, Grade A).[5] The behavioral techniques help the patient to learn ways to control his bladder, bowel, and pelvic floor muscles and sphincters. These techniques are considered safe and do not have side effects.

According to the International Continence Society[6] an assessment of the pelvic floor must include the clinical reasoning required for the diagnostic decision-making, but are not limited only to competency of the assessor, the assessment protocol must be conducted taking into account that this is a sensitive examination
of an intimate body part, and for ethical and legal reasons, appropriate informed consent must be obtained. Furthermore, it should be mentioned the importance of using standardized nomenclature, validated quality of life scales and questionnaires, in order to assess the impact and severity of the dysfunction in the individual's life and also to analyze the improvement with the therapeutic approach adopted.[6]

The literature reports that anal incontinence is a more common condition in women and is mainly due to obstetric injury with damage to the anal sphincter or pudendal nerve. However, other common risk factors include irritable bowel syndrome, and neurological disorders such as diabetes. Therefore, more information is needed about nal incontinence and other anorectal disorders and their treatments, emphasizing that an accurate, detailed assessment based on the best available scientific evidence is essential.[7,8]

Based on the above considerations, it is evident that this is an women's health area, which presents multifactorial and complex problems that require a thorough and multiprofessional approach.

Silvana Uchôa, PhD from the Universidade Católica de Pernambuco, Recife, PE, Brazil, is a specialist in the treatment of pelvic floor disorders and biofeedback.

Correspondence: silvana.uchoa@unicap.br

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Repercussions of circulatory electrical stimulation on quality of life, lubrication and pelvic floor muscles: a pilot study

Repercussões da eletroestimulação circulatória na qualidade de vida, lubrificação e musculatura pélvica: um estudo piloto

Emanuelle Milayne Araújo dos Santos *
Amanda Lopes Moura
Lucas Queiroz de Arruda
Silvana Maria de Macedo Uchôa

Universidade Católica de Pernambuco (UNICAP), Recife, PE, Brazil

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*** Correspondence:** emanuellemilayne@gmail.com

Abstract

Introduction: The climacteric is one of the transition periods in the life cycle of women between the reproductive and non-reproductive phase, and it is characterized by various metabolic, psychological and social changes, either by psychic disorders or sexual dysfunctions promoting changes in quality of life. **Objective:** To analyze the repercussions of electrical stimulation on quality of life, lubrication and myoelectric activity of pelvic floor muscles in postmenopausal women. **Methods:** This was a pilot study in which the sample consisted of ten menopausal volunteers aged 48-60 years. We used the Female Sexual Function Index questionnaire to determine the improvement in lubrication and the WHOQOL-BREF questionnaire to assess quality of life. The pelvic floor muscles were evaluated by electromyography with an intracavitary electrode. The protocol used was: phasic contraction evaluated by three contractions of two seconds and six of rest; three tonic contractions for ten seconds with ten-second rest; and endurance for thirty seconds. The intervention was performed by another researcher, through circulatory stimulation with the Dualpex 961 Quark®. **Results:** Electromyography after circulatory stimulation showed statistically significant results with an increase in Fast Fourier Transform in tonic and phasic contractions, obtaining a positive effect on the perception and awareness of contractions due to increased blood flow. Also, there was improvement in lubrication and quality of life in all areas. **Conclusion:** Circulatory stimulation had repercussions on pelvic floor muscles in menopausal women in both muscle physiology and lubrication, with an influence on the quality of life of volunteers.

Keywords: Electrical stimulation. Electromyography. Lubrication. Menopause. Quality of life.

Resumo

Introdução: *O climatério constitui um dos períodos de transição no ciclo vital da mulher entre a fase reprodutiva e a não reprodutiva, caracterizado por várias alterações metabólicas e psicológicas, seja por distúrbios psíquicos ou disfunções sexuais, promovendo alterações na qualidade de vida.* ***Objetivo:*** *Analisar as repercussões da eletroestimulação na qualidade de vida, lubrificação e atividade mioelétrica dos músculos do assoalho pélvico em mulheres menopausadas.* ***Métodos:*** *Trata-se de um estudo piloto no qual a amostra foi composta por dez voluntárias em menopausa com idade entre 48 e 60 anos. Para avaliar a melhora da lubrificação foi utilizado o questionário Female Sexual Function Index. Quanto à qualidade de vida, utilizou-se o questionário WHOQOL-bref. Já para a avaliação dos músculos do assoalho pélvico, utilizou-se a eletromiografia com eletrodo intracavitário. O protocolo utilizado foi: contração fásica avaliada por três contrações de dois segundos e seis de repouso; três contrações tônicas sustentadas por dez segundos com repouso de dez segundos;* endurance *durante trinta segundos. A intervenção foi realizada por outra pesquisadora, através de estimulação circulatória com o aparelho Dualpex 961 Quark®.* ***Resultados:*** *A eletromiografia pós-estimulação circulatória obteve resultados significativos, com aumento na* Fast Fourier Transform *nas contrações tônicas e fásicas, obtendo efeito positivo na percepção e conscientização das contrações devido ao aumento do fluxo sanguíneo. Houve, também, melhora na lubrificação e na qualidade de vida em todos os domínios.* ***Conclusão:*** *A estimulação circulatória apresentou repercussões nos músculos do assoalho pélvico em mulheres menopausadas tanto na fisiologia muscular quanto na lubrificação, influenciando a qualidade de vida das voluntárias.*

Palavras-chave: *Eletroestimulação. Eletromiografia. Lubrificação. Menopausa. Qualidade de vida.*

Introduction

Climacteric is one of the transition periods in a woman's life cycle between the reproductive and non-reproductive phases, characterized by various metabolic, psychological and social changes. It is a natural and physiological period, in which there is a reduction in the level of estrogen and, consequently, structural and functional changes in the ovarian follicles, thus causing amenorrhea with systemic and potentially pathological consequences. It is characterized by hormonal changes, menopause, changes in physical aesthetics, and psychological and social changes, impacting the genitourinary system.[1]

These changes can be physiological, causing extragenital disorders such as decreased libido, complaints of urinary incontinence, changes in muscle tone, and weakness of the pelvic floor muscles (PFMs), among others, which can lead to sexual dysfunction. It can also generate psychic disturbances, such as hot flashes, irritability, increased sweating, tiredness, weakness, and depression, among others, which can lead to reduced self-esteem and to insecurity.[1,2]

Any change in the pelvic PFMs can cause dysfunction, negatively interfering with female sexual function, causing repercussions in the phases of sexual response - desire, excitement, orgasm and resolution, thereby resulting in the emergence of sexual dysfunctions. Through various methods and techniques, physiotherapy has increasingly stood out in the safe and effective treatment and prevention of these disorders. One of the main evaluation methods is surface electromyography (EMG), and as a treatment, there is electrical stimulation.[3]

EMG is a resource that aims to assess myoelectric activity, that is, the triggering of action potentials in the musculature. The muscles are evaluated both at rest and during voluntary contraction, whether they are tonic contraction muscles, with a predominance of type I, slow, fatigue-resistant and deep fibers, or fast contraction, with a predominance of type II, phasic fibers, which are fatigable, acting on the superficial PFMs. EMG also assesses endurance, which is the endurance capacity of type I muscle fibers.[4,5]

Electrical stimulation is a feature of the electro-therapeutic arsenal, which offers local proprioception and tones the PFMs by emitting electrical stimuli to local nerve endings. Circulatory stimulation, a type of function present in the electrical stimulation equipment used in this study increases blood flow to the urethra and PFMs and reestablishes neuromuscular connections, improving the function of muscle contraction and performing passive contraction of the perineal muscles.[6] The equipment used has therapeutic parameters that correspond to pulse width, current intensity and the stimulus time applied, acting on type I and II muscle fibers. There are several types of currents, but the one used in this study was the biphasic, symmetric current, whose therapeutic action occurs at low frequency.[7-9]

Thus, the aim of this study was to analyze the repercussions of circulatory electrical stimulation on quality of life, lubrication and myoelectric activity of pelvic floor muscles through surface EMG in postmenopausal women.

Methods

This was a pilot study carried out from July 2018 to July 2019 and approved by the Ethics and Research Committee on Humans of the Catholic University of Pernambuco (UNICAP), No. 2009.800. Data collection was carried out at the Corpore Sano Physiotherapy School-Clinic, linked to UNICAP. All volunteers signed an informed consent form.

We used a convenience sample consisting of 10 women who were seen twice a week for a period of five weeks, totaling ten appointments. Initially, in an evaluative way, the WHOQOL-BREF and Female Sexual Function Index (FSFI) questionnaires were administered, and EMG was then performed. After completion of the assessment, electrical stimulation was applied in an interventional manner. Only electrical stimulation was performed in the following sessions. In the last and tenth visit, at the end of five weeks, a reassessment was carried out using the same evaluation criteria. Electrical stimulation and EMG were collected by different authors of the present study to preserve data reliability.

The study included postmenopausal women with sexual dysfunction who were between 48 and 60 years old. Women with diabetes mellitus, severe osteomyoarticular diseases, urinary incontinence, or urinary and gynecological infections, patients with psychiatric disorders and those with neurological and cognitive disorders were excluded.

The WHOQOL-BREF questionnaire is an abbreviated Portuguese version of the World Health Organization (WHO) quality of life assessment instrument, the WHOQOL-100. It consists of 26 questions in total, with two general questions about quality of life, and it is divided into facets and four domains: physical, psychological, social relationships and environment, with each facet being evaluated by one question. At the end, the average of the results of each facet is given by the sum of the interview values divided by the number of participants, evaluating the final average.[10] The higher the score, the better the quality of life is.

The FSFI, proposed by Rosen et al.[11] in 2000 was also applied. Although the FSFI assesses the female sexual response in six domains, in this study only the domain of vaginal lubrication was used, which is equivalent to questions 7 to 10. The total score is obtained in each domain multiplied by a specific value assigned to each dimension. Higher scores indicate better levels of sexual functioning. Each domain is individually evaluated to identify possible dysfunctions. Both questionnaires were administered on the first day of care for assessment and again on the tenth day.[11,12]

To determine the myoelectric activity of the PFMs, a surface electromyograph, Miotool Uro Miotec®, was used, and two EMG channels were used to record this activity, based on SENIAM standards (acronym for the European consortium Surface EMG for the Non-Invasive Assessment of Muscles). In the first channel, an intracavitary probe was used, which was placed in the vaginal canal with water-soluble gel, and in the second channel, two 3M™ disposable self-adhesive surface electrodes were applied to the right external oblique muscle, to verify synergy with PFMs. Finally, a reference electrode was fixed on the right anterosuperior iliac spine through a self-adhesive surface electrode, also 3M™.[13,14]

The women were in supine decubitus, with a pillow under their head and semi-flexed legs supported by a foam support. The lights were turned off to avoid any kind of interference from electromagnetic waves. Initially, the maximum voluntary contraction was evaluated, and subsequently, initial rest, phasic contraction, tonic contraction, endurance and final rest. The phasic contraction was evaluated through three 2-second contractions, with a rest of 6 seconds between them. The tonic contraction was determined through three sustained contraction for 10 seconds and with a rest between them for 10 seconds. Endurance was evaluated through a sustained contraction for 30 seconds. EMG was performed in the first appointment for evaluation and in the last appointment for re-evaluation of the PFMs at the end of the fifth week.

After collection, the electromyographic results were submitted to the application of a bandpass digital filter with a minimum cutoff frequency of 20 Hz and a maximum of 500 Hz. Next, we determined the root mean square (RMS), mean value of the square root, evaluating the level of EMG signal activity.[13,14]

For data analysis, initial rest, final rest, median frequency (MF) (it is the characteristic frequency that

demonstrates changes in fiber conduction velocity), phasic, tonic and endurance contractions, as well as the Fast Fourier Transform (FFT) were used for data analysis, which is the average for the analysis of frequencies involving the determination of the fatigue process, fiber conduction speed, fiber type and synchronization of motor units under normal or pathological conditions.[13] We selected the second contraction of the described protocol (phasic and tonic fibers) of each contraction made because it is considered more reliable.

Interventionally, after EMG, electrical stimulation was applied using the same intravaginal electrode and the same positioning. Electrical stimulation was performed using Dualpex 961 electrical stimulation equipment from Quark with biphasic, symmetric current, and whose therapeutic action occurs at low frequency. The parameters used were: circulatory electrical stimulation mode, frequency of 4 Hz and pulse width of 400 μs, with 20 minutes duration and amperage (AmP) adjusted according to the patient's sensitivity, with an initial average of 7 mA and having an average increase of 2 mA during the sessions according to the patient's comfort, not exceeding 30 mA. The appointments were carefully and consecutively followed twice a week for five weeks.

Data analysis was performed after reassessment with the questionnaires and EMG. Statistical analysis was performed using Microsoft Office Excel 2007 and GraphPad Prism 4 software. Data normality was evaluated using the Shapiro Wilk test. Comparison between means was done using the paired t-test, and between the medians, the Wilcoxon test for paired samples. All conclusions were drawn at a significance level of 5%.

For the dependent samples t-test, the calculation of the sampling power was performed a posteriori by the G*power 3.1.9.4 program, considering $\alpha = 0.05$ and effect size between 11 and 18.1% (considering the percentage of the differences in the means in the fields of quality of life). Based on these data, the estimated power ranged between 9 and 13.2%.

Results

The present study had 14 women as its initial sample, four of whom dropped out due to lack of time, ending in 10 volunteers with a mean age of 53.4 ± 3.9. Regarding the prevalent profile of volunteers, 70% had higher education, 50% were divorced and 70% had one or more deliveries (Table 1).

Table 1 - Profile analysis of the patients (n = 10)

Profile analysis of the patients		
	n (%)	**p-value**
Marital status		
Divorced	5 (50)	
Married	4 (40)	0.3556
Single	1 (10)	
Education		
Higher education	7 (70)	0.1534
High school	3 (30)	
Number of deliveries		
None	3 (30)	
One	3 (30)	
Two	2 (20)	0.6961
Three	1 (10)	
Four	1 (10)	
Race		
Black/brown	5 (50)	1.000
White	5 (50)	

Note: Numbers are expressed as mean ± standard deviation or frequency (%). T-test, chi-square test and Fisher's exact test.

Regarding quality of life, there was an increase in all domains of the post-intervention WHOQOL-BREF questionnaire, especially in the psychological domain, which includes self-esteem, negative and positive feelings, beliefs, and body image, among others; some of these factors are related to depression. The initial score was 3.58 ± 0.58, going to 4.11 ± 0.66. The domain of personal relationships, which encompasses sexual activity and personal relationships, had an initial score of 3.7 (2.3 - 3.7) and a final score of 4.0 (3.6 - 4.4), proving that through the applied therapy there was an improvement in the quality of life of these women (Table 2).

With regard to the FSFI questionnaire, all volunteers in the sample had sexual dysfunction; however, there was a statistically significant increase in the lubrication domain after circulatory stimulation (from 1,740 ± 1.78 to 2,550 ± 2.22), showing the effectiveness of electrical stimulation in lubrication (Table 3).

Regarding the electromyographic analysis (Table 4), the only parameter that showed a statistically significant difference was the FFT in tonic and phasic fibers after therapeutic intervention. When observing the EMG mean, despite not having obtained a significant value, a reduction in values could be observed in relation to rest,

showing that there was a difference in the initial and final relaxation. The phasic and tonic fibers showed a slight increase in mean contractions when compared to the initial and final contractions. On the other hand, MF in tonic fibers, rest and endurance declined.

Table 2 - Domains of WHOQOL-BREF questionnaire evaluated before and after intervention

Domains of WHOQOL-BREF questionnaire			
	Before	**After**	**p-value**
Physical	3.30 (2.8 - 3.7)	3.70 (3.6 - 4.3)	**0.0090***
Psychological	3.58 ± 0.58	4.11 ± 0.66	**0.0336****
Social relations	3.70 (2.3 - 3.7)	4.00 (3.6 - 4.4)	**0.0059***
Environmental	3.20 (2.8 - 3.6)	3.80 (3.1 - 3.9)	**0.0022***

Note: *Wilcoxon test - data are expressed as median (25 - 75% percentiles) for non-parametric variables. **Paired t-test - data are expressed as mean ± standard deviation for parametric variables. Values in bold indicate statistical difference ($p < 0.05$).

As for MF, although no statistically significant changes were seen, there was relevance in the findings; demonstrating a reduction in phasic and tonic contractions, when compared to the initial and final contractions, which were initially 165.6 ± 28.57 Hz (tonic fibers) and 177.5 ± 45.9 Hz (phasic fibers) to 157.2 ± 35.07 Hz (toned fibers) and 169.2 ± 48.9 Hz (phasic fibers).

Table 3 - Female Sexual Function Index questionnaire before and after the intervention

Female Sexual Function Index			
	Before intervention	**After intervention**	**p-value**
Lubrification	1.740 ± 1.78	2.550 ± 2.22	**0.0320**

Note: Paired t-test and Wilcoxon test. Values in bold indicate statistical difference ($p < 0.05$).

Table 4 - Electromyography values before and after treatment

Electromyography mean 9uv)			
	Initial	**Final**	p-value
Initial rest	8.20 (6.0 - 19.1)	9.00 (6.8 - 14.7)	0.6953*
Tonic fibers	21.56 ± 12.54	23.02 ± 10.13	0.7086**
Phasic fibers	20.70 ± 11.65	24.56 ± 10.40	0.2155**
Endurance	21.89 ± 12.44	21.26 ± 11.73	0.8658**
Final rest	8.90 (6.4 - 27.5)	10.60 (7.0 - 18.5)	0.2754*
Electromyography median frequency (Hz)			
Initial rest	214.50 ± 27.21	195.40 ± 28.54	0.1231**
Tonic fibers	165.50 ± 28.57	157.20 ± 35.07	0.5577**
Phasic fibers	177.50 ± 45.90	169.20 ± 48.90	0.4989**
Endurance	174.60 ± 35.78	169.30 ± 46.41	0.7802**
Final rest	206.60 ± 26.80	196.50 ± 36.59	0.4789**
Fast Fourier Transform of electromyography (Hz)			
Tonic fibers	64.33 ± 27.31	86.56 ± 29.02	**0.0102****
Phasic fibers	229.10 ± 68.10	278.60 ± 56.25	**0.0469****

Note: *Wilcoxon test – data are expressed as median (25-75% percentiles) for non-parametric variables. **Paired t-test – data are expressed as mean ± standard deviation for parametric variables. Values in bold indicate statistical difference ($p < 0.05$).

Discussion

The pelvic floor is composed of several muscles that have the function of maintaining urinary and fecal continence and supporting the pelvic organs, and that consist of 70% type I fibers and 30% type II fibers. With menopause, the pelvic muscles weaken, reducing muscle tone and favoring the onset of dysfunctions.[5,15]

To improve circulation, low-frequency neuromuscular electrical stimulation had effective and significant repercussions, demonstrated in EMG, questionnaires and descriptively through the reports of the participants in this study, where they reported improvement in lubrication and sexual desire, reduced sensation of vaginal discomfort and, consequently, the sensation of relaxation in the vagina after the intervention.

Despite the scarcity of articles related to circulatory electrical stimulation that may support our findings, similar studies were found, such as the one by Nappi et al.,[16] which investigated the use of electrical stimulation in the vestibular area and vaginal introitus in women complaining of sexual pain. The therapy has shown improvement in muscle contractile capacity, resting capacity, intensity and current increase. In the questionnaires used, there was a significant improvement, and four out of nine women with vaginismus returned to sexual activity.

Alves et al.[17] compared medium- and low-frequency neuromuscular electrical stimulation in women with stress urinary incontinence (SUI) and found that there was no significant difference between the evaluated groups, and concluded that both medium and low frequency were effective in the treatment of SUI.

In relation to lubrication, it was shown in the present study that circulatory electrical stimulation resulted improvement, obtaining a final total mean of 2,550 ± 2.22, indicating a higher score than the initial one; the maximum vaginal lubrication score in postmenopausal women would be six. Santos et al.[18] saw in their study that the use of TENS generated an increase in blood flow, with vasodilation and improvement in local tissue perfusion, in agreement with the present study, thus showing that electrical stimulation promotes lubrication and consequently reduces the discomfort during sexual intercourse.[18] With results similar to those found in this study, Magno et al.[19] evaluated the strength of the PFMs and then applied the FSFI questionnaire, demonstrating that the greater the force of contraction, the higher the scores obtained.

Santos et al.[20] used the FSFI questionnaire to determine which sexual dysfunction is more common among climacteric women. In their results, they observed that the domains desire, excitement, orgasm and lubrication together gave a percentage of 63.33%, which may pose possible risks of sexual dysfunctions.

As for quality of life, there was an increase in all domains after the application of electrical stimulation, especially in the psychological domain, which went from regular (3.58), according to the questionnaire score listed from one to five, to good (4.11), demonstrating that a positive effect was obtained for to this aspect. Likewise, the domain of personal relationships, initially regular (3.7), showed a significant improvement, resulting in a score of 4.0 (good) after the intervention. The environmental and physical domains, on the other hand, remained regular, but with an initial and final difference. Thus, there is evidence of a positive and relevant clinical difference in the quality of life of postmenopausal women and women with sexual dysfunction after the applied therapy.

From this perspective, Nazarpour et al.[21] examined the relationship between the quality of life and sexual function of postmenopausal women and found that 61% of the participants had sexual dysfunction. The FSFI scores were related to the WHOQOL-BREF, showing the importance of the sexual function in the quality of life of postmenopausal women.

Cabral et al.[22] evaluated the determinants of sexual dysfunction in middle-aged women using the FSFI, the WHOQOL-BREF and two other questionnaires. The authors found that about 67% of the participants had sexual dysfunction in the older age group; that is, menopausal women and women with more intense climacteric manifestations had low quality of life and greater disposition to develop sexual dysfunctions.

Nagib et al.[23] describe EMG as the most accurate method to measure neuromuscular integrity. The data presented in this study, in relation to EMG, demonstrated that there was an increase during the analysis of frequencies in the conduction velocity of tonic and phasic fibers, mainly the former. Thus, it is believed that there was a substantial synchronization of the motor units, which can be explained physiologically, because by increasing the local blood flow through

electrical stimulation, the oxygenation of the muscle fibers is increased, facilitating muscle contraction and tonicity of the PFMs.

The findings of Dias et al.[24] are in line with the present study, emphasizing that the increase in oxygen in muscle fibers causes physiological changes and affects myoelectric activity. According to the data presented, it was found that electrical stimulation has a positive effect on muscle oxygenation, facilitating lubrication and reducing some of the symptoms of the genitourinary menopause syndrome, providing women with a better quality of life.

It is believed that the mean of tonic fibers showed a slight increase, despite not being statistically significant, as the mean is valid when associated with the FFT result, which showed an increase, since the pelvic floor has a predominance of tonic fibers essential for the function of sustaining and maintaining continence. Tonic contraction fibers are oxidative, which makes it clear that the increase in local circulation generates changes in muscle fibers. Similarly, the same process occurs with the mean of the phasic fibers. Resende et al.[25] observed an increase in the recruitment of motor units during repeated maximal or sustained submaximal contractions to maintain the required strength level.

Although there were no statistically significant differences, the data regarding FM were relevant, which tended to show the highest frequency in fast contractions and lower frequency in tonic contractions.[25] There was a linear relationship between FM and fiber conduction velocity depending on the strength and diameter of the musculature. The smaller the muscle diameter, the lower the conduction velocity and, consequently, the lower the FM. The shorter the muscle, the greater the capacity to generate force, and therefore, the greater the driving speed and the greater the FM. [26]

The reduction in the median frequency in the phasic and tonic fibers in this study demonstrated that there were signs of fatigue in the musculature, as a result of the PFMs not being actively trained during the consultations and submitted to the electromyographic evaluation protocol. These data also suggest that there was a predominance of intermediate or tonic fibers, in agreement with the data presented in the FFT. Silva et al.[27] also found a significant reduction in FM when performing fatigue induction protocols. Burti et al.[28] observed that the signals for a fatigue protocol with tonic fibers can be identified with an increase in amplitude signals, a reduction in fiber conduction velocity and a reduction in FM.

Limitations of the study

The main limiting factor of the study was the small sample size, due to the reluctance of the volunteers to join the research. As it is an intravaginal method, many women reported embarrassment and shyness as factors for not participating, which leads us to reflect on how necessary it is to make discussion of the female body more fluid and natural. In addition, the study application time could have been longer to have obtained even more effective and significant results, thus generating a scope for further research along this line.

Conclusion

This study showed that circulatory electrical stimulation had positive effects on lubrication, the myoelectric activity of the pelvic floor muscles and the quality of life of postmenopausal women, especially in the psychological domain, which includes factors related to self-perception, anxiety and talking about sexuality and menopause.

Surface electromyography (EMG) improved the conduction velocity of the tonic fibers in the pelvic floor muscles , thus causing changes in the pelvic floor support muscle fiber. More scientific evidence is needed to corroborate these findings, so further studies should be conducted to go deeper into the proposed themes.

Authors´ contributions

All authors were responsible for the research, data collection and conceptualization of the article. EMAS carried out the writing of the manuscript, data collection and analysis, and development of the methodology, and worked on the results and discussion. SMMU, advisor, assisted in the methodology, preparation and revision of the manuscript in its different stages and provided guidance on data collection and analysis. ALM participated in the data collection and text revision and helped support the research planning. LQA collaborated in the research review and analysis.

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Effects of belly dancing intervention on sexual function and body image in breast cancer patients undergoing hormone therapy - randomized clinical trial

Efeito da dança do ventre na função sexual e imagem corporal de pacientes em hormonioterapia para o câncer de mama – ensaio clínico randomizado

Luiza Andreatta Denig *
Leonessa Boing
Tatiana de Bem Fretta
Fabiana Flores Sperandio
Adriana Coutinho de Azevedo Guimarães

Universidade do Estado de Santa Catarina (UDESC), Florianópolis, SC, Brazil

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*** Correspondence:** luiza.andenig@gmail.com

Abstract

Introduction: Breast cancer is a public health problem because of its high incidence. Its often-mutilating treatment can cause serious problems with regard to body image and sexual function in these women. Belly dancing is a possible option to improve the femininity of these women. **Objective:** The aim of this two-arm randomized study was to determine the effect of practicing belly dancing on sexual function and body image in breast cancer patients undergoing adjuvant hormone therapy in Santa Catarina, Brazil. **Methods:** The study randomized 24 women (60 ± 10.4 years old) diagnosed with breast cancer, 11 in the intervention group (IG) and 13 in the control group (CG). A questionnaire was used to evaluate personal and clinical characteristics, body image (BIBCQ), and sexual function (FSFI). **Results:** On the body image scale, in the domains of body stigma (p = 0.002) and body concerns (p = 0.017), significant intergroup differences were found, with better body image for the IG in the post-intervention period when compared to the CG. In sexual function, no significant differences were found. **Conclusion:** Belly dancing as physical exercise helps improve body image in patients with breast cancer undergoing adjuvant treatment with hormone therapy.

Keywords: Body image. Breast cancer. Dancing. Sexuality.

Resumo

Introdução: *O câncer de mama é um problema para a saúde pública devido ao alto número de incidência. Seu tratamento muitas vezes mutilador pode trazer sérios problemas na imagem corporal e na função sexual dessas mulheres. A dança do ventre vem como uma opção passível para melhorar a feminilidade dessas mulheres.* ***Objetivo:*** *Analisar o efeito da prática da dança do ventre na função sexual e na imagem corporal de pacientes em tratamento adjuvante de hormonioterapia para o câncer de mama em Santa Catarina.* ***Métodos:*** *O ensaio clínico randomizado de dois braços foi realizado com 24 mulheres (60 ± 10,4 anos) diagnosticadas com câncer de mama, sendo 11 no grupo de intervenção (GI) e 13 no grupo controle (GC). Utilizou-se um questionário avaliando características pessoais e clínicas, imagem corporal BIBCQ e função sexual FSFI.* ***Resultados:*** *Na escala de imagem corporal, nos domínios estigma corporal (p = 0,002) e preocupações com o corpo (p = 0,017), foram encontradas diferenças significativas intergrupo, com melhor imagem corporal para o GI no período pós-intervenção quando comparado ao GC. Na função sexual não foram encontradas diferenças significativas.* ***Conclusão:*** *Percebe-se a importância do exercício físico como a dança do ventre a fim de auxiliar na melhora da imagem corporal de pacientes com câncer de mama em tratamento adjuvante com hormonioterapia.*

Palavras-chave: *Imagem corporal. Neoplasias da mama.Dança. Sexualidade.*

Introduction

Breast cancer was one of the most common cancers worldwide in 2020,[1] with approximately 2.2 million new cases, making it a major health problem.[2] For Brazil, 66,280 new cases are predicted for the biennium 2020/2022, with the southern region of the country having the highest rate of new cases.[3]

Therefore, the treatments are of paramount importance, with surgery as the main one, supplemented with chemotherapy, radiotherapy, hormone therapy and target therapy, which can be administered jointly and complementarily. The choice depends on disease status, the type of tumor and the general health condition of the patient.[4,5] Despite the good cure rates, these multifactorial treatments contribute to the prolongation of the medical intervention's period, during which adverse side effects are observed,[5] including those related to body image and sexuality.[6]

Sexuality is one of the areas most affected by breast cancer treatment, where patients show lower levels of function and sexual satisfaction,[7] having a negative impact on quality of life.[4,7-9] These women with sexual dysfunction display physical and emotional dissatisfaction, with feelings of unhappiness[10] and depression,[9,11,12] and experience pain during sexual intercouse[13] and vaginal dryness[8,9,14] as most prevalent symptoms.

Just as changes in body image can be predictors for these sexual problems,[7,9] they are associated with mastectomy, weight gain,[9] hair loss, scarring and fatigue.[8] Fatigue can be aggravated by lack of physical exercise, which also intensifies physical exhaustion and loss of muscle strength.[5] Moreover, weight gain[15] with unbalanced distribution[16] and hair loss cause a negative self-assessment,[17] as well as the scars left by mastectomy.[18]

Physical exercise provides important benefits for patients with breast cancer, especially in the mobility of the shoulder girdle and upper limbs.[19] In addition, it improves quality of life and reduces fatigue symptoms.[20] One of the physical practices that is of benefit to patients is dancing, which helps in improving the strength and amplitude of the upper limbs.[21] Besides, it rescues the will of living,[22] improves quality of life,[21] brings self-esteem and vitality[23] and improves body image,[21] beyond reducing stress and pain[24] and factors associated with obesity and inflammation.[25]

Belly dancing is as an option that can be performed by women of all ages and physical types,[26] because it allows the exploration of sensuality and creative freedom,[27] in addition to contributing to flexibility, working on femininity and increasing self-esteem and consequently sexual activity.[26] Sensuality is awakened with belly dancing, as well as sexuality, making the woman more relaxed and freer with herself and, later, for relationships.[27] In the aspect of femininity, it is an important influential concept in body image,[28] where the breast is a symbol for women and their femininity for society. The study by Boing et al.[29] showed the positive effect of belly dancing for women with breast cancer on quality of life, fatigue and depressive symptoms.

Therefore, the aim of this study was to determine the effect of the practice of belly dancing on sexual function and body image in breast cancer patients undergoing adjuvant hormone therapy.

Methods

In this study, 24 women (60 ± 10.4 years) diagnosed with breast cancer and undergoing adjuvant hormone therapy were allocated at the Cancer Research Center (CEPON - Centro de Pesquisas Oncológicas) in Florianópolis, Santa Catarina. The study was approved by the Ethics Committee on Research in Human Beings of the Universidade do Estado de Santa Catarina (UDESC; protocol 2,073,549) and the Ethics Committee of the Cancer Research Center (protocol 2,319,138), and registered in the platforms Clinical Trial Registration (NCT03194997) and Universal Trial Number (U1111-1195-1623). All participating women signed an informed consent form for inclusion in the research project.

This randomized two-arm clinical trial analyzed the preliminary results of the MoveMama study.[30] For this study, the sample consisted of two groups: a) belly dancing intervention and b) control group, and both groups were allocated using the randomness technique.[31] The participants' recruitment was through lists made available by CEPON, of women undergoing adjuvant hormone therapy. All of them received two attempts to contact by telephone, where they were invited to participate in the study. Both groups received a personalized T-shirt of the project, as a way of identifying the participants and their inclusion.

Inclusion criteria were age above 18 years, clinical status I to III of breast cancer, being in treatment with hormone therapy, and permission to practice physical activity from the responsible oncologist or release from the physiotherapy sector of CEPON. Exclusion criteria were physical limitations (orthopedic or neurological) for the practice of physical activity and in participation in the collection of pre- and post-intervention data, and frequency less than 50% in the belly dancing classes of the intervention group.

The sample size's calculation was performed using the Software G*Power 3.1.9.2,[32] weighting the sexual function as the primary outcome of the study, based on the work by Boing et al.[30] who reported a 23% change in sexual function in the IG and -4% in the CG, with significance level of 5% and test power of 95%. With these parameters, a minimum of 28 patients was needed for the study, requiring 14 patients for each group.

Randomization and blinding were performed by researchers from the Laboratory of Research in Leisure and Physical Activity (LAPLAF/CNPq), based on a document provided by CEPON with a list of patients (stage I-III) who started adjuvant hormone therapy (n = 662) between 2015 and 2017 at CEPON/SC. Thus, the patients were invited by telephone to participate in the study, explaining the involvement of physical activity (dancing) and the application of questionnaires. The allocation in both groups (IG and CG) of the women who agreed to participate in the study was carried out by lot, using www.randomization.org. Blinding occurred in relation to data analysis, in which the researcher who performed the data analysis was not informed about the allocation of women in the groups.

Control group

The women selected for CG were asked to maintain their normal activities, and they were contacted twice by telephone (July and September 2018) to maintain follow-up and identify possible changes in relation to the practice of exercise. Educational actions were carried out during 16 weeks with the control group, with three 60-minute lectures on women's health and instruction of movements for upper limbs.

The first lecture took place one week after the beginning of the intervention (June 2018), with seven participants present, who received guidance on active upper limb movements by the researchers. In the eighth week after the beginning of the intervention (August 2018), the second lecture was attended by five women on self-esteem and body image, with reports from another participant who had already undergone similar experiences. Finally, the third lecture took place in the 16th week (September 2018), with 10 participants, with the theme of lymphedema prevention, held by a physiotherapist specialized in the subject.

In addition, a booklet on the benefits of physical activity was given, with the purpose of initiating the practice of physical exercise after the study. At the end of the research, the CG participants were invited to participate in a Health and Sports Center (CEFID)/ UDESC dance extension project aimed at women with breast cancer.

Intervention group

The women drawn for IG participated in 16 weeks of belly dancing classes three times a week at CEPON. The structure of each class was divided into three

parts: 1) warm-up and stretching, 2) main part and 3) relaxation, according to the protocol of Boing et al.[30] The rhythm and intensity of the classes were planned and progressively defined by the beats per minute (bpm) of the songs.[33] For the first part, slower songs up to 80 bpm were used for the sequence of broad joint movements for 10 minutes. The joint actions attended were flexion, extension, abduction, adduction and rotation, starting from the upper body until reaching the lower limbs, thus developing motor coordination and body awareness and improving the range of motion of the upper limbs. This part was also worked on in the main stage of the class, in addition to basic scans of rhythm and the explanation of the objective of the session, followed by the practical part of teaching the step technique.

The dynamics of the class was individual, in pairs or in group, guided by the rhythm of the music, in which the participant was not obliged to follow, respecting limits and expression of feelings. For this, medium to fast music (120 to 150 bpm) was used. The average duration of this part was 40 minutes. For relaxation, lasting 10 minutes, the rhythm of the music was decreased to 120 bpm, with slow movements for heart rate normalization. To end and conclude the session, a discussion round was held about the students' perception of the class given.

The IG women adherence was determined as follows: number of sessions attended/48 sessions planned x 100,[34] and the number of sessions attended was recorded by the researcher during the intervention period. In this study, three questions were evaluated: personal and clinical variables, sexual function, and body image.

Personal and clinical variables: anthropometric measurements, with height being obtained using a fixed stadiometer on the wall (Sanny, height of 2.0 m and scale of 0.1 cm), and body composition using a digital scale (Toledo, model 2096 PP, capacity of 200 kg and resolution of 50 g). Body mass index was determined by dividing weight (kg) by height (m) squared. The BMI classification was made for better analysis of the results, considering normal weight BMI to be 18.5 to 24.9 and overweight BMI ≥ 25. The socioeconomic variables analyzed were age, education, profession, marital status and economic level. The economic level was characterized as: upper class (A and B), middle (C) and low (D and E). This classification was according to IBGE, in addition to the monthly salary of 2018 of R$954.00. Clinical variables such as previous treatment, type of hormone therapy, recurrence, presence and symptoms of lymphedema, characteristics of surgical intervention (conservative/total/bilateral), breast reconstruction (late/immediate/unperformed), emptying (axillary/sentinel lymph node) and urinary incontinence.

Sexual function: the Female Sexual Function Index (FSFI) was used, which had been validated, translated and culturally adapted by Thiel et al.,[35] with a Cronbach's alpha of 0.98. For cancer patients, it was validated internationally with a coefficient of 0.70.[36] The FSFI consists of 19 items separated into six scales: desire (questions 1 and 2), arousal (3 - 6), lubrication (7 - 10), orgasm (11 - 13), satisfaction (15 and 16) and pain or discomfort (17 - 19). To calculate the final score, each scale is summed and multiplied by a specific value according to the domain: desire - 0.6; excitation - 0.3; lubrication - 0.3; orgasm - 0.4; satisfaction - 0.4; and discomfort/pain - 0.4. The score is obtained by the sum of the items of each domain, ranging from 2 to 36 points, in which the highest score implies a better sexual function.

Body image: Body Image After Breast Cancer Questionnaire (BIBCQ) is a questionnaire created by Baxter et al.,[37] translated, validated and culturally adapted by Gonçalves et al.,[38] with the objective of analyzing the impact of breast cancer on body image. It consists of 44 Likert questions divided into six scales, with the score varying between domains: vulnerability (8 to 45 points), body stigma (10 to 65), limitations (6 to 30), body concerns (6 to 30), transparency (5 to 30) and arm concerns (3 to 15). For the result, the higher the score achieved by the patient, the more compromised was the body image evaluated.

Data collection was performed at the Health and Sports Center (CEFID) of the State University of Santa Catarina (UDESC), with an approximate duration of 30 minutes, and was carried out by a team of LAPLAF/CNPq researchers duly trained, with a time and date previously scheduled with the patients. For the statistical analysis of the results, the SPSS program - version 20.0 was used. The personal and clinical characterization of the participants was verified using Fisher's exact test. For the results of body image and sexual function, the paired t-test and the Wilcoxon test were used, after demonstrating normality by the Shapiro-Wilk test. In the intergroup analysis, the t-test for independent samples and the Mann-Whitney U test were used. A significance level of 5% was used.

Results

Figure 1 shows the flowchart for the selection of women for the study. Table 1 presents the personal and clinical characterization of the study participants, showing a homogeneity between the groups, with significant difference only for the reconstruction variable (p = 0.012).

Significant intergroup differences (Table 2) were found in the domains body stigma (p = 0.002) and body concerns (p = 0.017), showing better body image for IG in the post-intervention period in these two scales when compared to CG. There were also significant effects in the intragroup analysis for IG in the domains of body stigma (p < 0.001) and body concerns (p < 0.001) in the comparison between the pre- and post-intervention periods. The adherence of the participants was 67.8%. In sexual function, presented in Table 3, no significant differences were observed in the intra- and intergroup analysis.

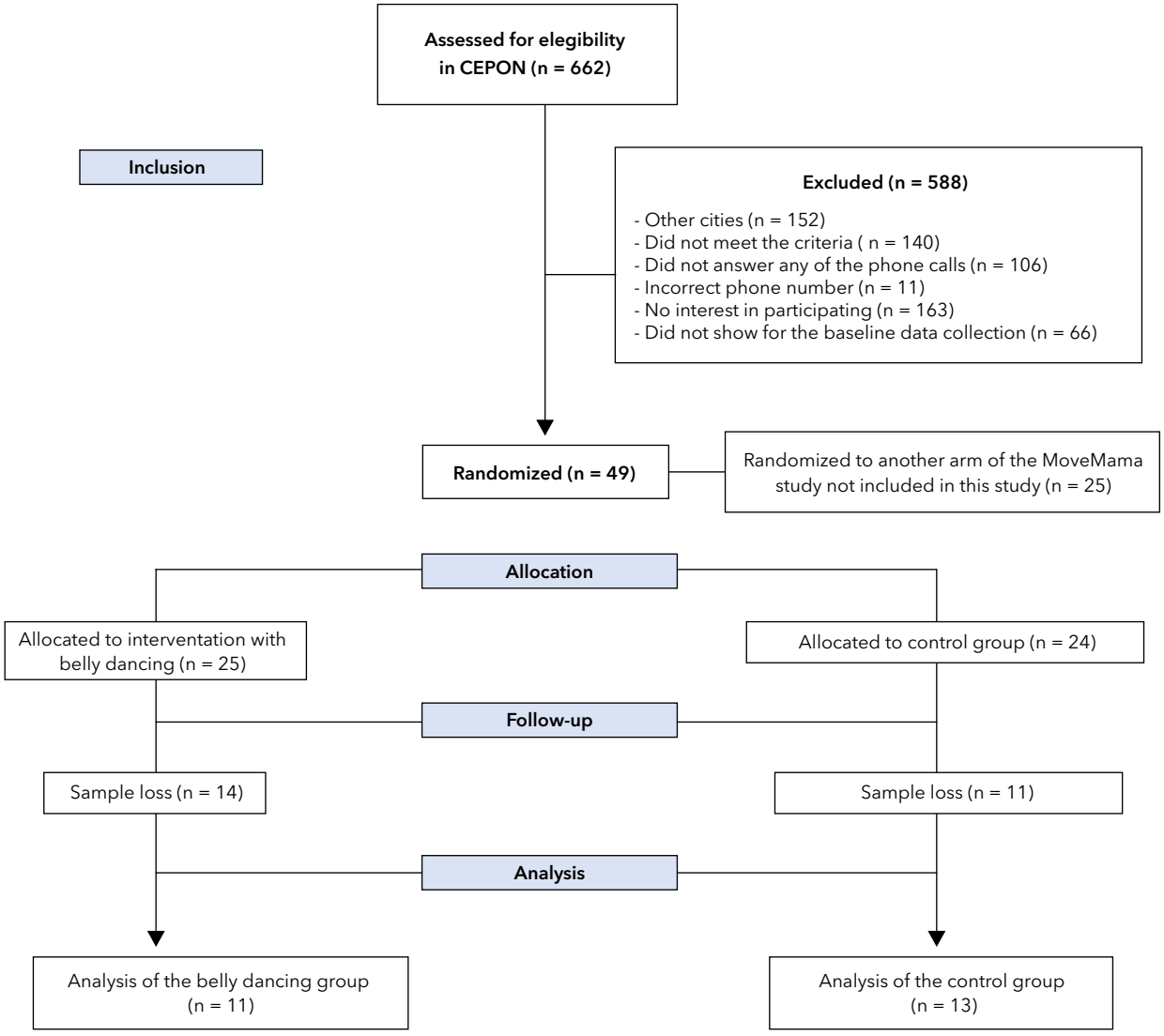

Figure 1 - Flowchart for women's selection for the randomized clinical trial.

Note: CEPON = Centro de Pesquisas Oncológicas (Cancer Research Center), Florianópolis, SC, Brazil, 2018.

Table 1 - Personal and clinical characterization of the study participants according to the intervention (IG) and control (CG) groups

	Total	IG (n = 11) %	CG (n = 13) %	p-value
BMI classification				
Overweight	68.2	54.5	81.8	0.361
Normal weight	31.8	45.5	18.2	
Schooling				
Primary education	13.6	9.1	18.2	
Secondary education	59.1	63.6	54.5	1.000
Higher education	27.3	27.3	27.3	
Occupation				
Holding one or more jobs	27.3	18.2	36.4	
Retired	54.5	63.6	45.5	0.843
Unemployed or homemaker	18.2	18.2	18.2	
Marital status				
No partner	59.1	81.8	36.4	0.080
With partner	40.9	18.2	63.6	
Income				
Upper class (A+B)	9.1	18.2	0.0	
Middle class (C)	18.2	18.2	18.2	0.522
Lower class (D+E)	72.7	63.6	81.8	
Previous treatment				
Yes	95.5	90.9	100	1.000
No	4.5	9.1	0.0	
Hormone therapy				
Anastrozole	54.5	45.5	63.6	
Tamoxifen	36.4	45.5	27.3	0.817
Exemestane	9.1	9.1	9.1	
Recurrence				
Yes	4.5	9.1	0.0	1.000
No	95.5	90.9	100	
Lymphedema				
Yes	9.1	18.2	0.0	0.476
No	90.9	81.8	100	
Lymphedema symptom				
Yes	36.4	45.5	27.3	0.659
No	63.6	54.5	72.7	
Mastectomy type				
Total	13.6	9.1	18.2	
Conservative	77.3	81.8	72.7	1.000
Bilateral	9.1	9.1	9.1	
Reconstruction				
Immediate	9.1	9.1	9.1	
Late	27.3	0.0	54.5	0.012
Not performed	63.6	90.9	36.4	
Axilla				
Axillary emptying	40.9	36.4	45.5	
Lymph node biopsy	45.5	36.4	54.5	0.269
Not performed	13.6	27.3	0.0	
Urinary incontinence				
Yes	13.6	9.1	18.2	1.000
No	86.4	90.9	81.8	

Note: Fisher's exact test.

Table 2 - Body image of breast cancer patients in the intervention (IG) and control (CG) groups

	IG (n = 11)				CG (n = 13)				
Body image	**Pre**	**Post**	**p-value intragroup***	**CIS**	**Pre**	**Post**	**p-value intragroup***	**CIS**	**p-value intergroup****
Vulnerability	15.5 ± 8.1	16.6 ± 6.0	0.738[a]	+1.1	17.7 ± 4.8	17.2 ± 7.3	0.826[a]	-0.5	0.833[c]
Body stigma	52.6 ± 8.0	22.7 ± 7.0	**< 0.001[a]**	-29.9	40.5 ± 13.1	39.7 ± 13.8	0.891[a]	-0.8	**0.002[c]**
Concern with body	24.1 ± 3.3	11.2 ± 3.2	**< 0.001[a]**	-12.9	16.9 ± 5.4	14.7 ± 3.3	0.088[a]	-2.2	**0.017[c]**
Limitation	13.7 ± 4.5	11.0 ± 4.4	0.153[b]	-2.7	11.6 ± 4.5	10.9 ± 4.2	0.723[b]	-0.7	0.815[d]
Transparency	8.5 ± 5.0	8.0 ± 3.8	0.797[b]	-0.5	8.3 ± 4.7	8.5 ± 5.6	0.722[b]	+0.2	0.626[d]
Concern with arms	6.8 ± 3.5	5.36 ± 2.1	0.303[b]	-1.4	6.2 ± 3.0	5.3 ± 3.4	0.423[b]	-0.9	0.669[d]

Note: Pre = before intervention; post = after intervention; CIS = change in score. *p-value for comparison between the pre- and post-IG and CG periods; **p-value for comparison between IG and CG in the post-intervention period. [a]T-test for paired samples. [b]Wilcoxon test. [c]T-test for independent samples. [d]Mann-Whitney U test. Significant value ($p < 0.05$) highlighted in bold. The lower the score, the better the body image was.

Table 3 - Sexual function in breast cancer patients in the intervention (IG) and control (CG) groups

	IG (n = 11)				CG (n = 13)				
Sexual fucntion scales	**Pre**	**Post**	**p-value intragroup***	**CIS**	**Pre**	**Post**	**p-value intragroup***	**CIS**	**p-value intergroup****
Desire	5.0 ± 1.4	4.5 ± 1.6	0.147[a]	-0.5	4.6 ± 1.1	1.0 ± 1.3	0.089[a]	+3.6	0.673[d]
Arousal	1.2 ± 2.0	0.9 ± 1.9	0.752[a]	-0.3	2.6 ± 1.9	2.5 ± 1.8	0.933[a]	-0.1	0.346[d]
Lubrication	1.5 ± 2.2	1.2 ± 2.1	0.683[a]	-0.3	2.8 ± 2.0	2.9 ± 1.7	0.324[a]	+0.1	1.000[d]
Orgasm	1.3 ± 2.0	1.0 ± 1.9	0.674[a]	-0.3	2.8 ± 1.9	2.6 ± 1.5	0.723[a]	-0.2	0.325[d]
Satisfaction	1.6 ± 1.6	2.1 ± 1.4	0.396[b]	+0.5	2.4 ± 1.2	1.8 ± 1.2	0.144[b]	-0.6	0.720[c]
Desconforto	1.6 ± 2.2	1.3 ± 2.4	0.753[a]	-0.3	3.7 ± 2.4	3.9 ± 2.4	0.623[a]	+0.2	0.931[d]
Total score	12.6 ± 9.4	11.3 ± 9.4	0.753[a]	-1.3	19.3 ± 8.8	18.4 ± 7.3	0.715[a]	-0.8	0.074[d]

Note: Pre = before intervention; post = after intervention; CIS = change in score. *p-value for comparison between the pre- and post-IG and CG periods; **p-value for comparison between IG and CG in the post-intervention period. [a]T-test for paired samples. [b]Wilcoxon test. [c]T-test for independent samples. [d]Mann-Whitney U test. The lower the score, the worse the sexual function.

Discussion

The main study objective was to analyze the effect of the practice of belly dancing on the sexual function and body image of breast cancer patients undergoing adjuvant hormone therapy, cared for at CEPON in Florianópolis, SC. The study did not show significant intra- and intergroup differences in sexual function; on the other hand, there was a significant intergroup result in body image in the domains body stigma and body concerns, with both domains showing better body image for IG.

Patients submitted to the belly dancing intervention for 16 weeks showed no effect on the final score of sexual function, as well as on any of its scales. It is noted that the sample in general had values lower than 26 points in the final scale of sexual function, which means a higher risk for sexual dysfunction. These findings may be related to the negative effect of treatment for breast cancer.[7,39] Hormone therapy reduces sexual function, which may be an inhibiting factor of sexual function.[40] The discomfort domain of the women who participated in the intervention showed a low mean, indicating no significant improvement, and this domain is the symptom that most influences sexual function,[13] which may explain the lack of improvement in this variable. In

addition, 60% of the women in this study were without a partner. Moreover, the mean age of the study was 60 ± 10.4 years, and some studies indicate that starting at this age, there is impaired sexual function,[10,40,41] lack of opportunity for sex because of the absence of a sexual partner,[42] and decreased libido,[40] because of reduced estrogen and progesterone production.[43]

We highlight the findings regarding the significant intergroup difference in the domains of body stigma and body concerns, with better body image for women randomized to IG. Body image is considered as the way one evaluates one's own body and how it is represented in the mind.[38] Belly dancing comes to the aid of this concern through its aesthetics and pattern of movements,[44] with continuous, large and sensual elements. Moreover, this practice improves body posture and body awareness, physical conditioning and functional performance.[44] Thus, belly dancing is a therapeutic practice that helps one regain the significance of one's body, as well as self-awareness and self-acceptance.

Another study pointed out that women over the age of 50 who practiced belly dancing reported that dancing is a way of uniting body, mind and rhythm, and a form of collective joy.[27] The same study pointed out that the creation of friendships is facilitated with the practice, in which space becomes a place where women feel free to explore their creativity and body movement without fear of judgments, where the goal is to flow together as a unit, without competition and comparison.

Furthermore, the intervention and the practice of physical exercises, such as belly dancing, by women with breast cancer is very beneficial and documented in the literature; in other aspects, exercise stimulates high levels of quality of life,[20] increased muscle strength,[19,45] improved mood, maintenance of energy, improvement in emotional spheres, better sleep,[19] and less fatigue symptoms,[20,45] anxiety and depression.[18] On the other hand, lack of exercise aggravates the side effects of breast cancer disease and treatment, as it increases the feeling of fatigue and intensifies physical wear and tear, in addition to the loss of muscle strength.[5] Therefore, physical exercise should be encouraged for the prevention, treatment and post-treatment of breast cancer.[46]

Some limitations of the present study can be overcome, such as seeking more alternatives for the adherence of women to the program, such as closer and more easily accessible intervention sites, to reduce travel time, and special classes provided on the calendar. Another suggestion is the implementation of external characteristic elements of belly dancing, such as costumes and makeup. In addition, obtaining a larger sample size and a longer intervention time to intensify the practice and its benefits, even at the risk of sample loss.

Conclusion

Women who underwent belly dancing intervention showed significant changes in body stigma scores and body concerns in relation to body image. Thus, physical exercise is important in helping breast cancer patients return to their daily lives, and it improves factors that influence quality of life, with dancing being a practice that helps throughout the process. Therefore, further studies are warranted to examine the effect of physical activity and dancing on other aspects of these women's lives.

Considering the findings of this randomized clinical trial, multidisciplinary programs would be interesting and should be encouraged in breast cancer rehabilitation to improve the psychological and physical well-being of these women.

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Authors' contributions

LAD and LB worked on the study design, research, methodology, data collection and final writing. TBF worked on study concept, research, methodology and data collection. ACAG worked on the study concept, methodology and, together with the author FFS, the final writing of the work.

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Electrostimulation and pelvic floor muscle training: immediate effect after one single session

Eletroestimulação e treinamento dos músculos do assoalho pélvico: efeito imediato após uma sessão

Juliana Falcão Padilha
Kamyla Karla Amorim Passos
Jordana Barbosa da Silva
Patricia Driusso*

Universidade Federal de São Carlos (UFSCar), São Carlos, SP, Brazil

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*** Correspondence:** pdriusso@ufscar.br

Abstract

Introduction: Pelvic floor muscle training (PFMT) and neuromuscular electrical stimulation (NMES) are physiotherapeutic conservative treatments to prevent and to treat pelvic floor dysfunctions. **Objective:** To investigate the immediate effect of one session of PFMT versus NMES associated to pelvic floor muscle (PFM) contraction on the PFM function in nulliparous women. **Methods:** This is a cross-sectional experimental study. Twenty women were randomized into the "PFMT Group" and "NMES Group". PFM function evaluation was performed by vaginal palpation and manometry before and after a single session. PFMT was composed by one series of eight sustained contractions of 6 seconds and one series of four fast contractions, in four different positions. NMES parameters were: biphasic pulsed current; frequency: 50 Hz; pulse duration: 0.7 ms; cycle on:off 4:8s; rise/decay: 2/2s, time: 20 minutes; and intensity: participant' sensibility. Data was analyzed by the ANOVA two-way for repeated measures to verify the difference between groups, within group and the interactions for PFM function. A 5% probability was considered in all tests. **Results:** There were no significant differences between groups. At intra-group analysis, there was a significant decrease in the maximal voluntary contraction ($p = 0.01$), by manometry, between pre- and post-session for both groups. **Conclusion:** The immediate effects of a single session of PFMT and NMES associated with voluntary PFM contraction are similar on PFM function, that is, no difference was found between groups.

Keywords: Electric stimulation. Endurance training. Muscle fatigue. Muscle strength. Pelvic floor.

Resumo

Introdução: *O treinamento dos músculos do assoalho pélvico (TMAP) e estimulação elétrica neuromuscular (EENM) são recursos fisioterapêuticos utilizados para prevenir e reabilitar de forma conservadora as disfunções do assoalho pélvico.* ***Objetivo:*** *Investigar o efeito imediato de uma sessão de TMAP versus EENM associada à contração dos músculos do assoalho pélvico (MAP) sobre a função dos MAP em mulheres nulíparas.* ***Métodos:*** *Estudo experimental transversal. Vinte mulheres foram randomizadas em "Grupo TMAP" e "Grupo EENM". A avaliação da função dos MAP foi realizada por palpação vaginal e manometria, antes e após uma única sessão. O TMAP foi composto por uma série de oito contrações sustentadas de 6 segundos e uma série de quatro contrações rápidas, em quatro posições diferentes. Os parâmetros de EENM foram: corrente bifásica pulsada; frequência: 50 Hz; duração do pulso: 0,7 ms; ciclo on:off 4:8s; subida/descida: 2/2s; tempo: 20 minutos; e intensidade: sensibilidade da participante. O teste de ANOVA two-way para medidas repetidas foi aplicado para verificar a diferença intra e entre grupos e as interações para as variáveis da função dos MAP. Considerou-se nível de significância de 5% em todos os testes.* ***Resultados:*** *Não houve diferenças significativas na comparação entre grupos. Na análise intragrupo houve diminuição significativa da variável contração voluntária máxima (p = 0,01), por manometria, entre pré e pós-sessão para ambos os grupos.* ***Conclusão:*** *Os efeitos imediatos de uma única sessão de TMAP e EENM associados à contração voluntária dos MAP são semelhantes na função dos MAP, ou seja, nenhuma diferença foi observada entre os grupos.*

Palavras-chave: *Estimulação elétrica. Treinamento de endurance. Fadiga muscular. Força muscular. Assoalho pélvico.*

Introduction

The pelvic floor muscles (PFM) are subdivided into superficial and deep muscles. Therefore, PFM works as an unit and act together in order to promote the support of pelvic organs, sexual function and maintenance of urinary and fecal continence.[1] When PFM are integrated, PFM contract and relax voluntarily and involuntarily. A correct contraction of PFM results in an "up and in" movement of the pelvic cavity.[2] During a voluntary contraction, there is a recruitment of connective tissues, fascias and ligaments that reinforce the contraction movement, supporting the pelvic organs and softening the impact of intra-abdominal pressure.[3]

An incorrect PFM contraction is associated to an incomplete PFM recruitment, which may be related to the prevalence of dysfunctions.[4] Previous studies already indicated many physiotherapeutic techniques to treat and to prevent PFM dysfunctions. Among them, the pelvic floor muscles training (PFMT) is indicated as the first-line to treat urinary incontinence (UI).[5]

In addition, neuromuscular electrical stimulation (NMES) is a technique that aim to strength the PFM by stimulating the efferent motor fibers of the pudendal nerve, which causes the direct contraction of PFM or the striated periurethral musculature, enabling the mechanism of urethral sphincter closure.[6] NMES can be applied by the insertion of an intravaginal device that will directly stimulate the PFM to contract and relax.[7] Moreover, NMES can be associated to voluntary PFM contraction: concomitantly to the passage of electrical stimulation current, the physiotherapist may encourage the woman to perform voluntary PFM contractions. However, it is still inconclusive if the association of both methods is efficient to treat urinary symptoms.[8]

PFMT and NMES are considered conservative and preventive treatments for PFM dysfunctions.[8,9] In addition, both techniques may be applied to increase body and PFM awareness, which may be related to the improvement of PFM function.[10] However, previous studies only aimed to investigate the effect of both techniques in a long-term when treating some PFM dysfunction, especially UI.[8,9] It is still not known if a single session of either therapy may be associated to a PFM function improvement. Thus, the aim of the present study was to investigate the immediate effect of one session of PFMT versus NMES associated to PFM contraction on the PFM function in nulliparous women.

Methods

Study design

This is a cross-sectional study conducted according to the guidelines of Strengthening the Reporting of Observational Studies in Epidemiology (STROBE), performed at the Women's Health Research Laboratory, Department of Physical Therapy, Federal University of São Carlos (UFSCar). This study was approved by

the Ethics and Research Committee of UFSCar, CAAE: 23038019.2.0000.5504. All participants received an explanation about the study and gave their written informed consent.

Participants

Participants were recruited by social media, newspaper and folders. Women were included if they had 18 years old or more and if they were sexually active. They were excluded if they were pregnant or if they were in the postpartum period; had some vaginal infection and/or urinary tract infection; were unable to perform a voluntary PFM contract; had neurological disease, motor or neurological deficit of lower limbs; had been submitted to a previous surgical procedure in pelvic or abdominal region; had presence of pelvic organ prolapse that reached and/or exceeded the vaginal opening; intolerance to vaginal palpation or introduction of the manometer probe or the vaginal electrostimulation electrode; had difficulty in understanding the evaluations and the treatments techniques; were in physical therapy treatment for PFM dysfunctions.

Sample size calculation and randomization

The sample size calculation was performed using the G*Power 3.1.9.2 software, with a significance level of 5% and test power of 80%, resulting in a total of 20 participants. Participants were randomized into two groups: PFMT and NMES associated to PFM contraction.

The allocation of the participants was conducted by a blinded examiner (Physiotherapist A) who was not involved with the physical evaluation and the treatment of the participants. The randomization, with an allocation rate of 1:1, was conducted with a brown envelope. Twenty pieces of paper in a rectangular shape of two different colors (10 of each color) corresponding to both treatment techniques were used. Participant were encouraged to take one piece of paper from the envelope and then Physiotherapist A wrote down the color chose.

Questionnaires

To investigate the urogynecological historic of the participants, Physiotherapist A conducted a subjective evaluation by filling a questionnaire produced by the researchers. This questionnaire contained questions related to the personal, sociodemographic and urogynecological history. Sequentially, in order to investigate the degree of discomfort related to PFM dysfunctions, the Pelvic Floor Distress Inventory (PFDI-20), translated and validated into Brazilian Portuguese[11] was applied.

The questionnaire consists of questions from three different instruments (Pelvic Organ Prolapse Distress Inventory, POPDI-6; Colorectal-Anal Distress Inventory, CRADI-8; Urinary Distress Inventory, UDI-6) and assesses 20 symptoms of urinary, intestinal, and vaginal tract disorders. There are six items in the questionnaire that assess the symptoms of prolapse, eight questions related to anorectal symptoms and six questions for urinary symptoms. Affirmative answers are rated on a scale from 1 to 4 (1 = no discomfort; 2 = little; 3 = moderately; 4 = a lot). Each sub-questionnaire has a score from 0 to 100 and the highest score indicates the greatest discomfort related to the symptoms. The final score is obtained by adding the scores of the sub-questionnaires and ranges from 0 to 300, with the highest score indicating the greatest discomfort.[11]

PFM assessment

The PFM function was assessed by vaginal palpation and manometry. The second examiner, Physiotherapist B, who was blinded to the participant's allocation and to the subjective assessment, conducted the physical assessment before (pre-treatment) and 10 minutes (post-treatment) after the intervention.

Participants remained in the supine position with the hips and knees flexed at 45º.[12] During the evaluation, participants were instructed about how to perform a PFM contraction by the following verbal commands: 1. "Contract the pelvic floor muscles as if you were holding urine"; 2. "Make a movement with the muscles upwards and inwards"; 3. "Try not to contract the abdomen, gluteus or leg muscles while contracting the pelvic floor muscles"; 4. "Inhale when your muscles are relaxed and exhale when you are contracting your muscles".

During vaginal palpation, the physiotherapist assessed the PFM function by the maximal voluntary contractions (MVC) and endurance of PFM. Gloves and lubricant gel were used by the Physiotherapist B during the assessment. The reliability of bidigital vaginal palpation, conducted by the same examiner

who performed the PFM assessment at the present study, was reported in a previous study and is considered substantial (κw = 0.75).[13] Three MVC with an interval of 1 minute between each contraction were requested and were classified by the Modified Oxford Scale (MOS)[14] (0 = absence of contraction; 1 = flicker; 2 = weak; 3 = moderate; 4 = good; 5 = strong). The mean obtained from the three measurements was considered for analysis.

To evaluate the endurance, the examiner requested a sustained MVC and counted in seconds how long women were able to maintain the PFM contraction with the same degree of contraction that they presented in the MVC assessment. Time was counted in seconds and the maximal time considered were ten seconds. Three sustained voluntary contractions were request, with one minute of rest between them. The average obtained from the three measurements was included in data analysis.

Five minutes after vaginal palpation, MVC were evaluated by the Peritron® manometer (Cardio Design Pty Ltd, Oakleigh, Victoria, Australia), graded from 0 to 300 cmH_2O, with a vaginal probe (28 x 55 mm) attached. The probe was involved by a condom and lubricating gel was added to the probe before the insertion. The participants remained at the same position adopted during vaginal palpation. The device's vaginal probe was inserted 3.5 cm into the vagina, the place with highest pressure.[15] Three repetitions of the MVC were performed with three seconds duration, with an interval of one minute of rest between them. For analysis, the average of the three contractions was used.

Intervention

Both interventions were individual, occurred in a single session and were supervised by the Physiotherapist C, who was not involved with randomization and evaluations. To perform the PFMT, a supervised protocol was adapted from Bø et al.,[16] with 20 minutes of duration. During the PFMT, four different positions were adopted: (1) supine position with the hips and knees flexed at 45°; (2) on the knees; (3) sitting on the Swiss ball with the feet resting on the floor; (4) standing against the wall with feet parallel and semi-bent knees. For each of the adopted positions, one series of eight repetitions of sustained contractions of six seconds was performed, with 6 seconds of rest between them. After the series of sustained contraction, four fast contractions of one second were requested. This single session was composed by 32 sustained contractions of 6-seconds contractions and 16 fast of 1-second each of them.

The description of the parameters of NMES is in accordance with the instructions suggested by Barbosa et al.[17] NMES was applied by using a biphasic not polarized pulsed current with a rectangular waveform. Intravaginal probes were used, 19 cm long and 2 cm in diameter, with four metal rings, from the Dualpex 961 device from Quark® (Brazil). During the session, the Physiotherapist C fixed manually the intravaginal probe into the participant's vaginal canal to hold and to maintain the probe inside the vaginal canal during the entire time of electrostimulation. The parameters adopted are presented in Table 1.[18,19]

Table 1 - Neuromuscular Electrical Stimulation parameters

Neuromuscular Electrical Stimulation group parameters	
Frequency (Hz)	50
Pulse duration (ms)	0.7
Cicle on:off (s)	4/8
Time (min)	20
Rise/Decay (s)	2/2
Intensity (mA)	Participant' sensibility

Note: Hz = hertz; ms = milliseconds; s = seconds; min = minutes; mA = milliamperes.

During NMES application, participants were instructed to contract PFM simultaneously to the NMES during time ON, concomitantly with the current passage. Women performed approximately 75 sustained voluntary contractions following the NMES. Participants at the NMES groups did not performed fast contractions. To perform the NMES, the position adopted by the participant was the same requested during PFM assessment.

Statistical analysis

Data was analyzed using software R version 3.4.1 for Windows. The qualitative variables were analyzed according to the frequency and percentage and quantitative variables were assessed by mean and standard deviation. The normality of the data was tested by the Shapiro-Wilk test. The two-way ANOVA test for repeated measures was applied to verify the differences between groups (PFMT Group and NMES Group),

intragroup differences (pre- and post-intervention) and the interactions of the variables related to the MVC (assessed by vaginal palpation and manometry) and endurance. In all tests, a 5% probability was considered.

Results and discussion

The present study aimed to assess the immediate effect of the PFMT versus the NMES associated to the PFM contractions on PFM function, evaluated by vaginal palpation and manometry. Previous studies aimed to assess the effects of protocols of intervention of PFMT alone or in combination to the NMES on the quality of life, urine loss and others variables, while treating women with PFM dysfunctions.[8,9] Although, for the author's knowledge, this is the first study to assess the immediate effect of one single intervention on PFM function, which makes difficult to compare the results of the present study with the previous literature.

Twenty nulliparous women were included in the present study. The sample characterization is in Table 2.

At NMES group, none participants reported adverse effects after the session and the initial and final intensity varied on average of 13.3 ± 4.5 and 21.9 ± 7.5, respectively. The study flowchart is presented in Figure 1. No differences were found between PFMT and NMES groups (between groups analysis) for PFM function variables after one session of intervention.

At the intra-group comparison (within groups), there was a significant decreased and significant difference at MVC assessed by manometry for both groups, which suggests a possible fatigue of PFM at the post-session evaluation. No other significant differences were found at intra-analysis for either MVC or endurance, assessed by vaginal palpation. Results are presented in Table 3.

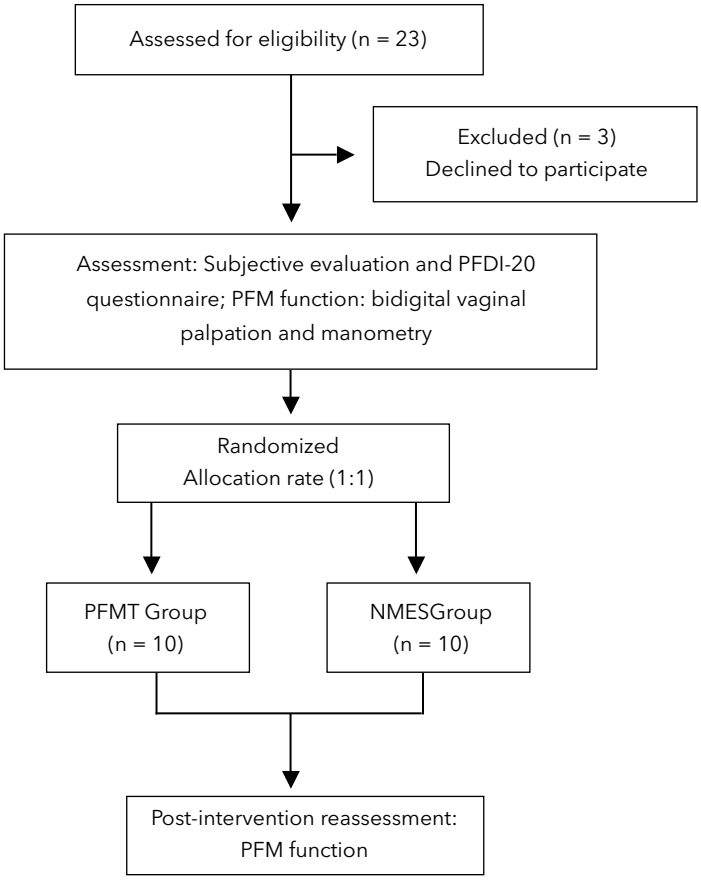

Figure 1 - Study flowchart.

Note: PFDI-20 = Pelvic Floor Distress Inventory; PFM = pelvic floor muscles; PFMT = pelvic floor muscles training; NMES = neuromuscular electrical stimulation.

Table 2 - Sample characterization

Variables	PFMT Group (n = 10)	NMES Group (n = 10)
Age mean (SD)	27.50 (3.83)	26.80 (4.15)
Age mean (SD)	27.50 (3.83)	26.80 (4.15)
Weight (kg) mean (SD)	65.17 (11.45)	61.41 (18.36)
Height (m) mean (SD)	1.61 (0.05)	1.63 (0.05)
Body Mass Index (kg/m²) mean (SD)	24.95 (3.93)	23.00 (6.07)
Occupation	**n (%)**	**n (%)**
Bachelor student	7 (70)	4 (40)
Physiotherapist	3 (30)	5 (50)
Public occupation	0 (0)	1 (10)
Education level	**n (%)**	**n (%)**
Complete graduation education	4 (40)	5 (50)
Incomplete graduation education	2 (20)	1 (10)
Postgraduate education	4 (40)	4 (40)
Ethnics	**n (%)**	**n (%)**
Mixed/Multiple ethnic	2 (20)	1 (10)
African	0 (0)	1 (10)
Caucasian	7 (70)	8 (80)
Not declared	1 (10)	0 (0)
Marital status	**n (%)**	**n (%)**
Single	8 (80)	8 (80)
Married	2 (20)	2 (20)
Physical activity	**n (%)**	**n (%)**
Practice	6 (60)	7 (70)
Do not practice	4 (40)	3 (30)
Menarche	**n (%)**	**n (%)**
11 years	3 (30)	4 (40)
12 years	5 (50)	1 (10)
13 years	1 (10)	2 (20)
14 years	0 (0)	3 (30)
16 years	1 (10)	0 (0)
Colorrectal symtoms	**n (%)**	**n (%)**
Constipation[a]	1 (10)	2 (20)
Anal incontinence[b]	2 (20)	2 (20)
Urinary symptoms	**n (%)**	**n (%)**
Urgency urinary incontinence[c]	0 (0)	1 (10)
Stress urinary Incontinence[d]	2 (20)	1 (10)
PFDI-20 mean (SD)	17.40 (23.62)	19.06 (20.45)
POPDI-6 mean (SD)	3.75 (7.97)	4.58 (7.97)
CRADI-8 mean (SD)	7.81 (7.34)	9.06 (8.65)
UDI-6 mean (SD)	5.83 (11.15)	5.42 (8.34)

Note: SD = standard deviation; PFMT = pelvic floor muscles training; NMES = neuromuscular electrical stimulation; PFDI-20 = Pelvic Floor Distress Inventory; POPDI-6 = Pelvic Organ Prolapse Distress Inventory; CRADI-8 = Colorectal-Anal Distress Inventory; UDI-6 = Urinary Distress Inventory. [a] PFDI-20 question 7; [b] PFDI-20 question 11; [c] PFDI-20 question 16; [d] PFDI-20 question 17.

Table 3 - Analysis of variance and comparisons between and within groups for pelvic floor muscles function before (pre) and after (post) treatment

	PFMT Group		NMES Group		ANOVA p-value		
	Pre	Post	Pre	Post	Between groups	Within group	Interaction
MVC (MOS)*	3.0 (0.86)	2.8 (0.77)	2.8 (0.65)	2.8 (0.83)	0.77	0.17	0.48
Endurance*	5.2 (2.81)	5.6 (2.18)	5.3 (2.38)	5.8 (2.29)	0.89	0.33	0.89
MVC (manometry)*	49.5 (26.96)	42.8 (24.56)[a]	43.8 (20.74)	38.9 (20.87)[a]	0.65	0.01	0.63

Note: PFMT = pelvic floor muscles training; NMES = neuromuscular electrical stimulation; MVC = maximal voluntary contraction; MOS = Modified Oxford Scale; *Mean (standard deviation); [a]Significant difference between pre and post within group.

The results of the present study showed that the immediate effects on PFM function after a single session of PFMT and NMES associated to PFM contraction are similar in women that voluntary contract PFM, with no differences between groups. In addition, the intra-group analysis showed that MVC decreased at manometry evaluation on both groups. According to these results, a single intervention is not able to improve PFM function. However, it is known that a single muscle contraction causes a co-contraction of the urethral sphincter due to the increased in urethral closure pressure, which lead to a reduction in the area of the levator ani by 25%, keeping the pelvic floor elevated and stabilized.[20] Moreover, to identify this contraction, methods such as electromyography or ultrasound should be applied. Therefore, to prevent and to treat PFM dysfunctions, a long-term intervention is necessary, as the repetition of PFM voluntary contractions leads to hypertrophy of muscle fibers, recruitment of motor neurons[19] and increased of the tone of PFM, with a consequent increase on the support of the bladder neck, which leads to the improvement of PFM function, especially to the continence during daily activities.[18]

Both PFMT and NMES are conservative methods that are indicate to treat or prevent PFM dysfunctions, especially UI.[8,9] Based on PFM voluntary contractions, PFMT is recommended as first choice of pelvic floor disorders treatment and is considered the gold standard for UI treatment.[9] NMES can be used when women are unable to contract PFM as the electrical stimulus may help woman to understand the contraction mechanism[21] and may improve the awareness of women who do not contract PFM voluntary during verbal commands.[22]

However, although the aimed of the present study was to compare the immediate effect of two single interventions, the NMES group was encouraged to perform PFM contractions simultaneously to the NMES application. Therefore, according to the results of a previous systematic review, the effect of the combination of NMES and other techniques as PFMT to treat UI is still inconclusive as studies have a high heterogeneity of protocols and there is a lack of studies that evaluate the general efficacy of both techniques.[8] It is still not possible to conclude that the NMES associated to the PFMT contraction are effective or not to improve PFM function according to the results of the present study, however, the combination of both techniques did not showed different benefits than the PFMT applied alone, right after one session.

Thus, the results of the present study may help women and physiotherapists to choose the resources that may be applied at the beginning of the physiotherapy treatment. At this time point, techniques that are related to self-efficacy are needed, as the physiotherapist expect that women follow the treatment and do not give up. Therefore, the physiotherapist must decide if an invasive technique will be used at the beginning of the treatment if the patient already know how to perform a correct PFM contraction.

According to the results of the present study, the PFMT performed without the intravaginal NMES is not different from the PFMT with an invasive technique, such the NMES. Moreover, the application of electrostimulation can generate pain and discomfort to the patient, which may disadvantage the indication of the technique during the treatment of urinary symptoms.[23] However, it is worth to highlight that NMES has benefits and it is indicated especially for patients who are unable or have difficulties to contract the PFM voluntary and need to learn how to contract the group muscle.

A voluntary PFM contraction is associate to a squeeze and inward lift of the PFM associated to a urethral closure, stabilization and resistance to downward movement.[24] According to a previous study that aimed to analyze the effect of the association of NMES to a grip muscular contraction, the NMES effects in combination with muscular contraction was not different from the muscular contraction alone.[25] In addition, Bø and Talseth[26] concluded that a PFM voluntary contraction is twice more effective than NMES alone to increase urethral pressure. In addition, the literature affirmed[27] that NMES associate to a muscular contraction may benefit individuals that are in extreme fatigue or individuals with some neurological or musculoskeletal diseases, as NMES facilitates the recruitment of additional muscle fibers and may increase the strength production. Therefore, in healthy individuals that are able to perform a voluntary contraction, NMES does not seem to increase strength production.[27]

The association of PFMT and NMES may cause muscle fatigue, indicated by the significant decreased in MVC assessed by manometry after a single session application. According to the previous literature, PFM are more rapidly fatigued than limb muscles, which can be associated to the reduction in the ability to activate the muscles during a MVC.[28] In the present study, women were contracting PFM during both interventions, which may lead to a muscles fatigue. Musculoskeletal fatigue refers to a decreased in strength or energy production in response to contractile activity, which can occur in response to intensity exercises of concentric, eccentric or isometric contractions.[29] PFM are composed by striated muscle fibers, 70% of which are Type I (slow contraction) and 30% are Type II (fast contraction).[29] When the exercise intensity increases and Type I motor units reach fatigue, there is a progressive involvement of Type II motor units which are fast-twitch fibers that quickly fatigue.[1]

This study has some limitations. The first one is related to the small sample size. In addition, the evaluation of the PFM with electromyography was not conducted. Although the results of the present study suggest that the protocols lead to a possible muscular fatigue, it was not possible to measure it. Nonetheless, other methods indicated to assess objectively the PFM function, such as ultrasound, were not applied and perhaps some changes related to the reduction in the area of the levator ani during contraction were not evaluated. However, vaginal palpation and manometry are often used in clinical practice, considered easy to apply and cheaper compared to other methods of evaluation. Therefore, we decided to conducted our data collection according to the methods often available in clinical practice.

Moreover, a control group was not included in the study design and women that were included in the present study were young, most of them were physiotherapists and were able to contract PFM voluntary, which make not possible to conclude that one single intervention of PFMT or PFM contraction associated to NMES improved self-perception or muscles recruitment.

Future researchers must investigate the effect of one singe intervention of PFMT or PFMT associated to NMES on PFM function of women that have different ages from the participants included in the present study, women that already had previous pregnancies and childbirth experience and women without pelvic awareness or low perception of PFM contraction. In addition, future studies should investigate the muscles fatigue caused by different PFM contraction protocols and techniques, such a NMES and PFM, applied alone or in concomitantly, by using other methods of evaluation (e.g., ultrasound).

Conclusion

The immediate effects of a single session of PFMT and NMES associated with voluntary PFM contraction are similar on PFM function. Both groups showed a significant decreased in MVC assessed by manometry immediately after one treatment session, which may suggest possible muscle fatigue.

Authors' contributions

JFP and PD have substantially contributed to the conception and design of the research. JFP, KKAP and JBS conducted the research and collected data, and JFP analysed it. All authors were responsible for drafting and critically revising the article for important intellectual content, as well for the final version here published.

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Prevalence of urinary incontinence, impact on quality of life and associated factors in users of Primary Health Care Units in Governador Valadares

Prevalência de incontinência urinária, impacto na qualidade de vida e fatores associados em usuárias de Unidades de Atenção Primária à Saúde

Camila Amâncio Alves
Denise Cristina Cardoso Ferreira*
Marina Ferreira de Lima
Karoline Amaral Coimbra
Camila Teixeira Vaz

Universidade Federal de Juiz de Fora (UFJF), Juiz de Fora, MG, Brazil

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*** Correspondence:** deniseccardosof@gmail.com

Abstract

Introduction: Urinary incontinence (UI) has a considerable negative impact on quality of life, resulting in psychosocial, emotional and health impairment, high costs to the health system and limited activities of daily living. **Objective:** To describe the proportion of women with UI and its impact on quality of life (QOL), and investigate the factors associated with this condition among users of Primary Health Care Units (PHCUs) in the municipality of Governador Valadares, Minas Gerais state (MG), Brazil. **Methods:** Cross-sectional study with female users of the municipal PHCUs. A questionnaire compiled by the researchers was used for data collection. Participants who reported urine leakage in any situation completed the International Consultation on Incontinence Questionnaire - Short Form (ICIQ-SF). **Results:** A total of 201 women took part in the study, 36.32% of whom had UI and obtained a score of 7, indicating a moderate impact on their QOL. Urinary incontinence was associated with age, income, body mass index and parity. **Conclusion:** The proportion of women with UI corroborates the prevalence described by the International Continence Society (ICS), moderately impacting quality of life and indicating normalization of the problem. Urinary incontinence was also correlated with age, income, BMI and number of pregnancies. This demonstrates the need for health education strategies at PHCUs to prevent and treat UI in this group, as well as intersectoral activities to improve the income of the population in order to control modifiable risk factors.

Keywords: Primary Health Care. Quality of life. Urinary incontinence. Women's Health.

Resumo

Introdução: *A incontinência urinária (IU) causa considerável impacto negativo na qualidade de vida, ocasionando prejuízo psicossocial, emocional e higiênico, além de alto custo para o sistema de saúde e limitações nas atividades de vida diária.* ***Objetivo:*** *Descrever a proporção de mulheres com IU e o seu impacto na qualidade de vida, bem como investigar os fatores associados a essa condição de saúde entre usuárias de Unidades de Atenção Primária à Saúde (UAPS) do município de Governador Valadares, MG.* ***Métodos:*** *Estudo transversal realizado entre mulheres usuárias de UAPS do município. Um questionário elaborado pelas pesquisadoras foi utilizado para coleta de dados. As participantes que relataram queixa de perda urinária em qualquer situação responderam ao International Consultation on Incontinence Questionnaire - Short Form (ICIQ-SF).* ***Resultados:*** *Participaram do estudo 201 mulheres. A proporção de mulheres com incontinência urinária foi de 36,32% e entre essas o escore do ICIQ-SF teve mediana igual a 7 pontos, indicando impacto moderado na qualidade de vida. A incontinência urinária associou-se à idade, renda, índice de massa corporal e paridade.* ***Conclusão:*** *A proporção de mulheres com IU está de acordo com a prevalência descrita pela International Continence Society (ICS), impactando moderadamente na qualidade de vida, o que indica uma normalização do problema. Ademais, a IU esteve associada à idade, renda, IMC e número de gestações. Assim, estratégias de educação em saúde para esse grupo são necessárias, a fim de prevenir e tratar a IU nas UAPS, bem como ações intersetoriais para melhorar a renda da população, no sentido de controlar os fatores de risco que são modificáveis.*

Palavras-chave: *Atenção Primária. Qualidade de vida. Incontinência urinária.*

Introduction

Urinary incontinence (UI), defined as the involuntary leakage of urine, predominantly affects women.[1,2] The most common forms of UI are stress incontinence, when urine leaks during exertion such as coughing or sneezing, increasing intra-abdominal pressure; urge incontinence, when involuntary urine leakage is preceded by an intense urge to urinate and mixed incontinence, referring to a combination of stress and urge incontinence. Additionally, overactive bladder is a combination of symptoms that result in the need to urinate more frequently and at night, with or without urge incontinence, in the absence of a urinary tract infection or any other obvious pathology.[1,2]

According to the International Continence Society (ICS), the prevalence of UI among women varies between 25 and 45%, increasing with age.[2] Risk factors for UI described in the literature are age, pelvic floor muscle dysfunction, high blood pressure and diabetes, as well as gynecological and obstetric factors such as gynecological surgeries, menopause, number of pregnancies and deliveries, birthweight, episiotomy and having at least one traumatic vaginal delivery.[2,3]

UI has a considerable negative impact on quality of life (QOL), resulting in psychosocial, emotional and health impairment, high costs to the health system and limited activities of daily living.[4] It can also hamper work-related activities, resulting in less productive professionals or altering their work pace, in addition to increasing expenditure on incontinence underwear and other products.[4,5]

Its high prevalence, negative impact on the quality of life and functionality of women and elevated treatment and management costs classify UI as a public health issue.[6] This makes it important for the scientific community to investigate UI in as yet unexplored scenarios and populations, such as female users of Primary Health Care Units (PHCUs) in Governador Valadares, Minas Gerais state, Brazil.

Thus, given that no studies on the topic in this municipality were found, the present study aimed to describe the prevalence of women with UI and its impact on their quality of life, and investigate factors associated with the condition among PHCU users in Governador Valadares.

Methods

This was a cross-sectional study conducted from November 2017 to February 2018, in the municipality of Governador Valadares. The sample consisted of female PHCU users, aged 18 years or over. The PHCUs were chosen by draw, with at least one unit selected in each of the 19 municipal regions and two PHCUs drawn in each of the three largest regions, totaling 22 of the 59 existing units in the city. Women under 18 years old, those who were pregnant, had difficulty understanding the questions and could not complete the questionnaire or refused to participate were excluded from the sample.

For those who fit in the inclusion criteria and accepted to participate, data were collected via an in-person interview by a previously trained interviewer. The questionnaire was compiled by the researchers and contained 19 questions. The explanatory variables were divided into the following four blocks:

1. Demographic and socioeconomic data: age (in years), marital status (married or common-law relationship), self-declared race/color (white, nonwhite), schooling level (0 to 4 years, 5 to 8 years, 9 to 11 years, 12 years or more) and household income (up to three minimum wages and three or more minimum wages).

2. Lifestyle: smoking (smoker, nonsmoker) and leisure time physical activity, such as walking/running, swimming and/or water aerobics, in the past four weeks (yes or no).

3. Health: body mass index (BMI), calculated based on self-reported weight and height (underweight, normal weight, overweight and obese); self-reported diseases (none, one or more); and self-perceived health, evaluated using the question "Would you say your health is very good, good, reasonable, poor or very poor?" and categorized as good (very good or good) or poor (reasonable, poor and very poor).

4. Gynecological and obstetric history: menopause (yes or no); hormone replacement therapy (yes or no); previous pelvic surgery (yes or no); number of pregnancies (quantity); type of delivery (vaginal, cesarean section, vaginal and cesarean section); use of forceps (yes or no); episiotomy (yes or no); and birthweight of largest newborn (in kilograms).

It was also questioned about the presence or not of UI symptoms, that was determined by the following question: "In the past four weeks, have you leaked urine when coughing or sneezing, before getting to the bathroom, while exercising or for no obvious reason?", adapted from question one of the International Consultation on Incontinence Questionnaire - Short Form (ICIQ-SF). Women who reported leaking urine in any of these situations were deemed to have UI symptoms and answered the ICIQ-SF.

The ICIQ-SF, a short specific questionnaire that assesses the impact of UI on quality of life and qualifies urine leakage, has been translated and validated for the Brazilian population. The instrument contains four questions that evaluate the frequency, severity and impact of UI, as well as a set of eight self-diagnostic items related to the causes of UI or situations experienced by the women. The total score is obtained by adding the first three questions and varies from zero to 21 points, whereby the higher the score the greater the impact of UI on quality of life.[7]

In descriptive analyses, frequencies were calculated for the categorical variables, and age, number of pregnancies and birthweight of largest newborn for the ICIQ-SF score; due to nonparametric distribution, median and interquartile range were calculated. In order to determine the association between the presence of UI symptoms and the categorical explanatory variables, the chi-squared and Fisher's exact tests were used, the latter when the expected value in each cell was lower than 5. The association between the response variable and age, number of pregnancies and birthweight of the largest newborn was assessed by the Mann-Whitney test for non-normal distribution. The analyses were performed using STATA software, version 13.0, considering a significance level of 5%.

The study was approved by the Research Ethics Committee of the Federal University of Juiz de Fora (CAAE 72527917.2.0000.5147) and all the participants provided written informed consent.

Results

Participants were 201 women with a median age of 46 years, most of whom were married or in a common-law relationship (67.7%) and had a high school diploma (45.3%). In terms of income, 78.6% had a household income of less than three minimum wages and most (65.7%) self-declared as nonwhite. With respect to lifestyle, most of the women were nonsmokers (96.02%) and did not engage in physical activity (72.6%). In regard to health, approximately half (50.8%) of the participants were normal weight, most (61.1%) had no diseases and 74.6% perceived their health as good (Table 1).

In terms of the gynecological and obstetric history of the women studied, most (75.6%) were undergoing menopause and 65.2% had been submitted to pelvic surgery. The median number of pregnancies was two. Most of the participants reported only one vaginal delivery (44.56%), without forceps (89.3%), but with an episiotomy (60.1%). The remaining sample characterization data are presented in Table 2.

Table 1 - Sample characterization regarding demographic and socioeconomic, lifestyle, and health variables

Variable	n (median)	Total (n = 201) (1Q-3Q)
Age (years)	46	38-55
Marital status		
Married or common-law relationship	136	67.6
Schooling level (years)		
0 to 4	46	22.9
5 to 8	36	17.9
9 to 11	91	45.3
≥ 12	28	13.9
Income		
Up to 3 minimum weight	158	78.6
BMI		
Normal weight	102	50.8
Overweight	57	28.4
Obese	42	20.9
Race		
White	69	34.3
Nonwhite	132	65.7
Smoking		
Nonsmoker	193	96.0
Plyshical activity		
Yes	55	27.4
Comorbidity[1]		
Yes	123	61.1
Self-perceived health		
Good	150	74.6

Note: BMI = body mass index. [1]Woman who reported one or more diseases, such as: high blood pressure, diabetes mellitus, among others.

Table 2 - Sample characterization regarding gynecological and obstetric variables

Variable	n (median)	Total (n = 201) (1Q-3Q)
Menopause		
Yes	49	24.4
HRT		
Yes	13	6.5
Previous pelvic surgery		
Yes	131	65.2
Number of pregnancies	2	2.0 - 3.0
Type of delivery		
Vaginal	86	44.5
Cesarean section	80	41.5
Vaginal and cesarean section	27	13.9
Forceps[1]		
Yes	12	10.6
Episiotomy[2]		
Yes	68	60.1
BLNB	3,5	3.2 - 3.8

Note: HRT = hormone replacement therapy; BLNB = birthweight of largest newborn. [1]Sixty-eight participants had undergone a cesarean section, meaning there is no information on the use of forceps or episiotomy; the total sample for these variables was 133. [2]Missing data for eight participants who could not recall this information.

The proportion of women with UI was 36.32% (95%CI: 29.61 – 43.02%). The median ICIQ-SF score was 7 points, with 5 points corresponding to the first quartile and 9 to the third.

The data in Table 3 show the results of association analyses. According to these findings, UI was associated with age (p = 0.042), income (p = 0.045), BMI (p = 0.020) and number of pregnancies (p = 0.002). The remaining variables were not associated with UI in the sample investigated.

Discussion

With the exception of schooling level, the main demographic, socioeconomic, clinical and obstetric history characteristics of participants in the present study were similar to those of populations in other national and international investigations.[4,8,9] The results of the present study demonstrate that despite the low income of participants, most had a high schooling level. This contrasts with other Brazilian investigations, in which most women had only completed basic education.[4,8] This can be explained by the fact that our participants were middle-aged and may therefore have had better educational opportunities than the older women targeted by the aforementioned studies. Individuals treated under the Brazilian National Health System (SUS in Portuguese) exhibit low schooling levels and income, whereas those who use private healthcare are better educated, have a higher income and private health insurance.[10]

Table 3 - Association between urinary incontinence (UI) and the variables investigated

Variable	Women without UI		Women with UI		p-value
	n (median)	% (1Q-3Q)	n (median)	% (1Q-3Q)	
Age (years)	44	38 - 53	49	40 - 59	0.041*
Marital status					
Married or common-law relationship	39	30.5	26	35.6	0.453
Single/Widow/Divorced	89	69.5	47	64.4	
Schooling level (years)					
0 to 4	26	20.3	20	27.4	
5 to 8	21	16.4	15	20.6	0.241
9 to 11	59	46.0	32	43.8	
≥ 12					
Income (minimum wage)					
Up to 3	95	74.2	63	86.3	0.045**
3 or more	33	25.8	10	13.7	
Body mass index					
Normal weight	70	54.7	32	43.8	
Overweight	39	30.5	18	24.7	0.020**
Obese	19	14.8	23	31.5	
Race					
White	41	43.9	28	25.1	
Brown	64	61.1	32	34.9	0.716
Black	17	17.8	11	10.2	
Other	6	5.1	2	2.9	
Smoking					
Smoker	5	5.1	3	2.9	
Ex-smoker	17	19.1	13	10.9	0.652
Never smoked	106	103.8	57	59.2	
Physical activity					
Yes	40	31.3	15	20.6	0.102
No	88	68.8	58	79.5	
Comorbidity[1]					
No	83	64.8	40	54.7	0.273
Yes	45	35.1	33	45.2	
Self-perceived health					
Good	101	78.9	49	67.1	0.065
Poor	27	21.0	24	32.8	
Menopause					
Yes	28	21.9	21	28.8	0.274
No	100	78.1	52	71.2	
Hormone replacement therapy					
Yes	10	8.3	3	4.7	0.382
No	118	119.7	70	68.3	
Previous pelvic surgery					
Yes	81	63.3	50	68.5	0.456
No	47	36.7	23	31.5	
Number of pregnancies	2	1 - 3	3	2 - 4	0.021*
Type of delivery					
Vaginal	48	40.0	38	52.1	
Cesarean section	57	47.5	23	31.5	0.091
Vaginal and cesarean section	15	12.5	12	16.4	
Forceps					
Yes	6	9.5	6	12.0	0.671
No	57	90.4	44	88.0	
Episiotomy					
Yes	34	53.9	34	68.0	0.132
No	29	46.0	16	32.0	
BLNB	3.47	3.15 - 3.8	3.6	3.24 - 3.95	0.067

Note: BLNB = birthweight of largest newborn. [1]Women who reported one or more diseases, such as high blood pressure, diabetes mellitus, among others. *Fisher's exact test significant at 5%. **Chi-squared test significant at 5%.

The proportion of women with UI in the present study was approximately 36%, which is consistent with the 25 to 45% described by the ICS for the female population.[2] However, other Brazilian studies have reported varying prevalences for different age groups. In a sample of women with an average age of 47.9 years, Junqueira et al.[11] found that 28% had UI, while a population-based study in São Paulo state in 2016 reported a UI prevalence of 52.3% in women over 50 years old.[4]

In regard to QOL, the median ICIQ-SF score recorded here was 7, representing a moderate impact (6-12) on the QOL of the women studied.[12] In a recent study, Alencar-Cruz and Lira-Lisboa[13] investigated incontinent women with an average age of 45.12 years and found that all the QOL domains of the King's Health Questionnaire were compromised, with the worst scores obtained for the impact of UI on QOL (average of 60.62). investigated incontinent women with an average age of 45.12 years and found that all the QOL domains of the King's Health Questionnaire were compromised, with the worst scores obtained for the impact of UI on QOL (average of 60.62).[4,13-15] The moderate impact observed on the sample may be because the women investigated were at the PHCUs seeking treatment for other health problems. Additionally, 67.12% of the women with UI perceived their health as good, meaning that since they may not view the condition as a health problem that needs treatment, its impact on their QOL is minimal.

Finally, in the present study UI was associated with age, income, BMI and number of pregnancies. The literature on the topic indicates that the prevalence of UI increases with age, as previously mentioned.[4,16] This is because aging is one of the main risk factors for UI, lowering estrogen levels in women undergoing menopause and reducing elastic and muscle fibers, resulting in weaker pelvic floor muscles (PFM).[17] Weakness in these muscles can reduce urethral closing pressure and support, altering UI mechanisms.[18]

With respect to income, Liu et al.[9] corroborated our results in reporting its association with the development of UI. The authors attributed this finding to the fact that individuals with a low income have limited access to healthcare services and occupations that require greater exertion, overloading the PFM. They concluded that people with higher earnings more often adopt preventive measures such as a healthy lifestyle, regular physical exercise and weight control, reducing their risk of developing UI.[9] Additionally, epidemiological studies are categorical on the association between income and health-related outcomes, identifying low income as an important risk factor for different diseases, including dyslipidemia, heart disease, nervous system disorders, diabetes, respiratory diseases,[4,9,19,20] and microcephaly linked to the Zika virus.[21] A possible explanation for the correlation between income and other health events in these epidemiological studies is that people with a higher income have better access to health-related goods and services.[4,9,19-21]

In regard to BMI, a Brazilian population-based study[4] observed an association between BMI and UI, corroborating the results presented here. The literature highlights overweight and obesity as risk factors for UI.[2] There is evidence that obesity increases intra-abdominal pressure, predisposing these individuals to stress incontinence due to the resulting overload of the PFM, conjunctive tissue and pelvic floor innervation, which could lead to noticeable structural damage and neurological dysfunction.[2,22] On the other hand, metabolic syndrome associated with obesity predisposes individuals to stress incontinence.[2]

In regard to number of pregnancies, Nobrega et al.[23] reported a correlation between multiparity and UI, corroborating our findings. The PFM undergo anatomical and physiological changes during pregnancy, compromising their urinary continence function and making pregnancy an important risk factor for UI.[2] Additionally, the production of hormones such as relaxin during this period, which contributes to relaxing ligaments and structures, and multiparity, which heightens the response to hormones, may result in greater susceptibility to UI in subsequent pregancies.[24]

Certain methodological limitations of the present study should be taken into account when interpreting the results. The first is the lack of a clinical diagnosis of UI. Another potential limitation is information bias, since the data were self-reported and collected by means of a questionnaire. Additionally, the difficulty in establishing a temporal relationship between UI and associated factors precluded drawing conclusions on a causal relationship given the cross-sectional study design. Moreover, the conclusions of this study cannot be extrapolated to the general population because it involved a convenience sample of female health service users, who may differ from women in the general community. Finally, the sample size was not determined by calculation.

Conclusion

Despite its limitations, this study is important to the municipality of Governador Valadares, MG, since it is the first to investigate the topic.

It can be concluded that the proportion of women with UI in the city is consistent with that described by the ICS and that it has moderate impact on their quality of life. These findings could guide local healthcare professionals and administrators in proposing health promotion and UI prevention and treatment strategies based on the reality and context of these women. Given that factors associated with UI (BMI and income) are modifiable, health services, especially PHCUs, can develop strategies to prevent this condition, such as creating specific operational groups to train PFM and encouraging physical activity and a healthy diet in order to lower BMI. In regard to income, municipal administrators should adopt intersectoral initiatives to improve the income of this population, such as educational and economic policies. Finally, specific operational groups should be created to provide women with PFM exercises in order to prevent and/or treat UI.

Authors' contributions

CAA and CTV contributed to the idea formulation, study design, hypothesis and work objective. All authors contributed to the statistical analysis, writing of the manuscript, review and approval of the final version.

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Impacts of COVID-19 on physiotherapy care for women with breast cancer

Impactos da COVID-19 nos atendimentos fisioterapêuticos a mulheres com câncer de mama

Brenda de Andrade Ayres Primo [1*]
Célia Katiuscia Duarte Dantas [1,2]
Caroline Wanderley Souto Ferreira [2]

[1] Brazilian Hospital Services Company (EBSERH), Hospital das Clínicas, Universidade Federal de Pernambuco (UFPE), Recife, PE, Brazil
[2] Universidade Federal de Pernambuco (UFPE), Graduate Physiotherapy Program, Recife, PE, Brazil

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*** Correspondence:** brenda4@hotmail.com

Abstract

Introdution: COVID-19 has been declared a public health emergency of international concern by the World Health Organization, with a diverse clinical spectrum. Given the coronavirus prevention measures and recommendations from health authorities, there is a concern about how physiotherapy care is provided to women with breast cancer. The discontinuity of care may favor the emergence of complications, and compromise functionality, quality of care and the provision of complementary treatments. **Objective:** To assess the impacts of the COVID-19 pandemic on the continuity of physiotherapy care for women with breast cancer. **Methods:** This is a cross-sectional study. Data were collected through an online questionnaire and the population was composed of physiotherapists, of both sexes, who work in Brazil. **Results:** Twenty percent of the 40 participants reported no change in their work routine, 48% had their workload reduced, 12% had an increased workload, 25% were relocated to provide assistance to patients affected by COVID-19, and 20% of consultations were suspended. The greatest continuity of care was seen in hospital admissions (40%) and outpatient clinics (42%). The number of women cared for before the pandemic compared to during the restriction period declined by 72%. **Conclusion:** Most consultations were suspended; however, in most cases, continuity of care was guaranteed through telerehabilitation. Nevertheless, the interviewees reported clinical worsening in women after treatment was interrupted.

Keywords: Breast neoplasms. COVID-19. Pandemic. Physical therapy. Rehabilitation.

Resumo

Introdução: *A COVID-19 trata-se de uma situação de emergência de saúde pública de importância internacional, cujo espectro clínico é diverso. Levando em consideração as medidas de prevenção ao coronavírus e as recomendações das autoridades de saúde, surge a preocupação de como estão os atendimentos fisioterapêuticos a mulheres com câncer de mama, já que sua descontinuidade pode favorecer o aparecimento de complicações, prejuízos na funcionalidade, na qualidade de vida e na realização de tratamentos complementares.* ***Objetivo:*** *Avaliar os impactos da pandemia de COVID-19 na continuidade dos atendimentos fisioterapêuticos a mulheres com câncer de mama.* ***Métodos:*** *Trata-se de uma pesquisa transversal. Os dados foram coletados por meio de questionário on-line e a população foi composta por fisioterapeutas que atuam em território brasileiro.* ***Resultados:*** *De um total de 40 participantes, 20% relataram não ter sofrido alteração na rotina de trabalho, 48% tiveram a carga horária reduzida, 12% sofreram aumento de carga horária, enquanto 25% foram realocadas de setor para prestar assistência aos acometidos pela COVID-19. Vinte por cento dos atendimentos foram suspensos, sendo os locais com maior continuidade na assistência os de internação hospitalar (40%) e ambulatórios (42%). Quanto ao número de mulheres atendidas antes da pandemia em comparação ao número durante o período de restrição, houve uma queda de 72%.* ***Conclusão:*** *Verificou-se suspensão da maior parte dos atendimentos, no entanto, em sua maioria, a continuidade da assistência foi garantida através de teleatendimento. Não obstante, os entrevistados relataram piora clínica no quadro das mulheres após o período de suspensão do tratamento.*

Palavras-chave: *Neoplasias de mama. COVID-19. Pandemia. Fisioterapia. Reabilitação.*

Introduction

COVID-19, caused by the new coronavirus (SARS-CoV-2), was declared a public health emergency of international concern. It exhibits a diverse clinical spectrum, ranging from mild (fever, fatigue and nonproductive cough), to moderate (dyspnea) or severe symptoms, when the patient develops severe acute respiratory syndrome.[1] The preventive measures adopted in Brazil followed World Health Organization (WHO) recommendations, which include frequent hand washing, mask wearing, avoiding touching the eyes, nose and mouth, respiratory hygiene practices, and social distancing.[2]

With the advance of the pandemic in the country, there was a need to expand the healthcare infrastructure for people who progressed to the most serious form of the disease. Faced with this emergency health situation, a significant number of people affected by other health conditions continued to need treatment.[3] The Brazilian Society of Surgical Oncology estimates that, in a three-month period of the pandemic, 171,000 were not diagnosed with cancer and previously diagnosed cases had their treatment delayed, possibly leading to longer and/or aggressive treatments, with higher morbidity, mortality and cost.[3]

Patients who had already started treatment are more likely to exhibit physical and functional complications if early physical therapy is not performed. Rehabilitation becomes paramount, since it displays a number of therapeutic possibilities that may be used in all stages of cancer treatment (diagnosis, chemotherapy, radiotherapy, hormone therapy, post-surgery, disease recurrence and palliative care), contributing to reducing of cancer-related fatigue, improving general conditions, and lowering the risk of surgical complications and injuries.[4-6]

Among women, breast cancer is the mostly commonly diagnosed cancer worldwide, except in Eastern Africa and Australia/New Zealand. In 2020, the International Agency for Research on Cancer estimated 2,261,400 new cases of breast cancer.[7] In Brazil, according to the National Cancer Institute, 66,280 new cases are estimated annually for 2020-2022.[8] This type of carcinoma has a good prognosis when detected and treated early.[9]

Although breast cancer treatment has made considerable progress, leading to a significant reduction in mortality rates, 90% of patients are affected by sequelae.[10] Complications vary widely in severity and may lead to short- and long-term functional impairments, including lymphedema, pain, functional changes and axillary web syndrome.[4,5,10,11] In addition, the abovementioned complications may compromise the activities of daily living, quality of life and complementary treatments, such as radiotherapy, typically performed after breast-conserving surgery.[12,13]

As a way of contributing to preventive measures against COVID-19, physiotherapist associations recom-

mended partial or total suspension of in/person care. This measure resulted in therapy postponement or discontinuation of those already underway.[6] Thus, there is a concern about physical therapy monitoring in breast cancer patients. Given the above, the present study aimed to assess the impacts of the COVID-19 pandemic on physical therapy care for women with breast cancer.

Methods

This is a cross-sectional study. Physical therapists of both sexes who worked in Brazil and treated women with breast cancer were included, while incompletely filled-in questionnaires were excluded. Data were collected in October and November 2020, through an online questionnaire (Figures 1 and 2), disseminated through telephone contacts via a messaging application (WhatsApp), emails and social networks (Instagram). The e-mail addresses of the participants were collected from the website of the Brazilian Association of Oncologic Physical Therapy (ABFO).

The questionnaire contained information on sex, age, length of experience in caring for patients with breast cancer, region of the country, workplace and sector where the respondent works, changes in routine as a result of the pandemic, continuity of in-person care, number of patients monitored before the pandemic and those whose care was interrupted, remote follow-up and how patient contact was conducted at a distance. In addition, questions were asked about resuming treatment, changes observed in patients and clinical status of newly admitted patients.

The present study was approved by the Research Ethics Committee (REC) of the Hospital das Clínicas of the Federal University of Pernambuco, under protocol number 4,313,820.

Results

Six of the 46 completed questionnaires were excluded, one due to incorrect completion and five for duplicity. The sample was composed of 40 physical therapists, one (2.5%) male and 39 (97.5%) female, aged between 21 and 54 years, with mean and standard deviation of 37.4 ± 7.9 years. Most physiotherapists (50%) worked in the Northeast of the country, followed by the Southeast (32.5%), South (12.5%), Midwest (2.5%) and North (2.5 %). Data on length of experience caring for patients with breast cancer, workplace and sector are described in Table 1.

EFFECT OF THE PANDEMIC ON THE PHYSIOTHERAPY TREATMENT OF PATIENTS WITH BREAST CANCER

Physiotherapists who treat patients with breast cancer, you are invited to participate in the research project entitled "Effect of the COVID19 pandemic on the physiotherapy treatment of patients with breast cancer".

This study is justified due to the importance of identifying the effect of the pandemic on the physiotherapy treatment of patients with breast cancer, in order to minimize it.
The main object is to assess the impact of the COVID19 pandemic on the physiotherapy treatment of patients with breast cancer.

The data will be collected via an online questionnaire, which you will complete digitally.
The study poses a little risk, since it involves an online questionnaire, with the possibility of embarrassment or a feeling of invasion of privacy when answering the questions. However,these situations will be minimized because you will complete the instrument anonymously.

By participating in this study you will contribute to our understanding of the effects the pandemic could have on the treatment of patients with breast cancer, helping us to devise strategies to mitigate the effectsidentified.

You are free to participate or not. It is your right to refuse, and you can withdraw consent at any phase of the research, with no repercussions. All the information from this study will be confidential and disseminated only at scientific events or in scientific journals. You will incur no costs during this research.

If you have any questions or wish to receive more information on the study, contact us at: brenda4@hotmail.com

Click on "Next" below to confirm you have read the informed consent form and have decided to voluntarily participate in this study.

Figure 1 - First page of the online form containing informed consent.

EFECT OF THE PANDEMIC ON PHYSIOTHERAPY TREATMENT OF PATIENTS WITH BREAST CANCER

Full name:*
Your answer

Sex:*
- ◯ Female
- ◯ Male

Age (only numbers):*
Your answer

How many years have you been treating patients with breast cancer?*
- ◯ Less than 1 year
- ◯ 1 - 3 years
- ◯ 3 - 5 years
- ◯ More than 5 years

In which region of Brazil do you work?*
- ◯ North
- ◯ Northeast
- ◯ Midwest
- ◯ Southeast
- ◯ South

Where do you work?*
- ☐ Outpatient/Public clinic
- ☐ Outpatient/Private clinic
- ☐ Public hospital
- ☐ Private hospital
- ☐ Home care

What sector do you work in?*
- ☐ Intensive care unit
- ☐ Hospital ward
- ☐ Private office/Outpatient clinic
- ☐ Home care

Your work routine:*
- ☐ My routine has not changed because of the pandemic
- ☐ My workload decreased because of fewer patients during the pandemic
- ☐ My workload increased during the pandemic
- ☐ My workplace treats patients with COVID and I was transferred to that unit

During the pandemic, in-person treatments for patients with breast cancer continued in the following sectors:*
- ☐ Outpatient
- ☐ Hospital admissions
- ☐ Home care
- ☐ None, all were cancelled

How many patients with breast cancer, on average, were you treating before the pandemic?*
Your answer

How many of your patients had to interrupt their treatment due to the pandemic?*
Your answer

Does your workplace provide any remote treatment for patients who are not going for outpatient treatment?*
- ◯ Yes, the service provides remote treatment
- ◯ Yes, I was advised to treat remotely, but was not provided with any resource to do so
- ◯ My boss did not advise me to treat remotely
- ◯ Not applicable

In relation to patients who were no longer receiving in-person physiotherapy treatment:*
- ◯ An instruction booklet was sent by email or app and patients were subsequently called to provide further explanations
- ◯ Patients only received a telephone call/contact with instructions
- ◯ Treatment was continued through digital appointments
- ◯ No contact was made or instruction booklet created

Have treatment for patients with breast cancer that were suspended because of the pandemic resumed?*
- ◯ Yes
- ◯ No

In the cases where treatment was suspended, but patients have resumed in/person treatment, was any change in their clinical condition observed?*
- ◯ Yes, most patients exhbited a worsened clinical picture
- ◯ No, the clinical picture of most patients remained unchanged
- ◯ Yes, most patients showed an improvement in their clinical picture
- ◯ Not applicable

In relation to new patients (whom you did not treat before the pandemic), do you consider that they are presenting with any difference when compared to patients in an habitual context?*
- ◯ Yes, new patients are presenting with more complications and complaints than ususal
- ◯ No, the complications and complaints observed have been the same as those exhibited by patients at other times
- ◯ I have not treated any new patient thus far

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Figure 2 -Questionnaire to assess the impacts of COVID-19 on physical therapy care for women with breast cancer.

Table 1 - Data on physical therapist care

Professional experience	**n (%)**
Less than 1 year	4 (10)
Between 1 and 3 years	4 (10)
Between 3 and 5 years	7 (18)
More than 5 years	25 (62)
Workplace*	
Outpatient Clinic/Public clinic	9 (22)
Outpatient Clinic/Private clinic	19 (48)
Public hospital	15 (38)
Private hospital	3 (8)
Home care	9 (22)
Work sector **	
Intensive care unit	2 (5)
Hospital ward	11 (28)
Office/Outpatient	34 (85)
Home care	13 (32)

Note: *Some physiotherapists worked in more than one location. ** Some physiotherapists worked in more than one sector within their workplace or in one sector plus home care.

Data on workplace and sector revealed that 35% of physiotherapists worked in at least two different areas within the same institution or in different sectors, such as a hospital ward and outpatient clinic, or in more than one location. Most of the professionals (77.7%) involved in home care (22.5%) worked double shifts, providing services in hospitals and/or clinics, both public and private. A curious fact was that 85.7% of the physiotherapists who worked in at least two different locations had more years of experience, with at least three years in cancer physiotherapy.

Many workload changes occurred due to the need to adapt to COVID-19: nineteen (48%) had their workload reduced by the interruption of care due to preventive measures, five (12%) had an increased workload, ten (25%) were relocated from their sector to provide direct care to COVID-19 patients, and eight (20%) reported no change in their workload.

During the pandemic, it was found that 20% of appointments for breast cancer patients were cancelled. At the facilities that continued providing care, hospitalizations and outpatient clinic appointments were 40 and 42% of normal levels, respectively. Only 22% of home care appointments were continued.

There was a 72% drop in the number of appointments during the period of greatest restrictions when compared to before the pandemic (207 and 749, respectively). In regard to management counseling and remote monitoring strategies for patients who were not receiving in-person care, 27.5% of professionals did not receive any advice on remote monitoring and no guidelines were established for this purpose, as shown in Figures 3 and 4.

According to the interviewees, 82% of suspended treatments have resumed, 40% of professionals observed a worsening in the women's clinical condition, 30% considered the conditions similar and the other 30% answered "not applicable". In regard to admitted patients, 40% considered that complications and complaints were the same as those of women who sought care before the pandemic, 32.5% reported that new patients were presenting with more complications and complaints than usual and 27.5% have not treated any new patients to date.

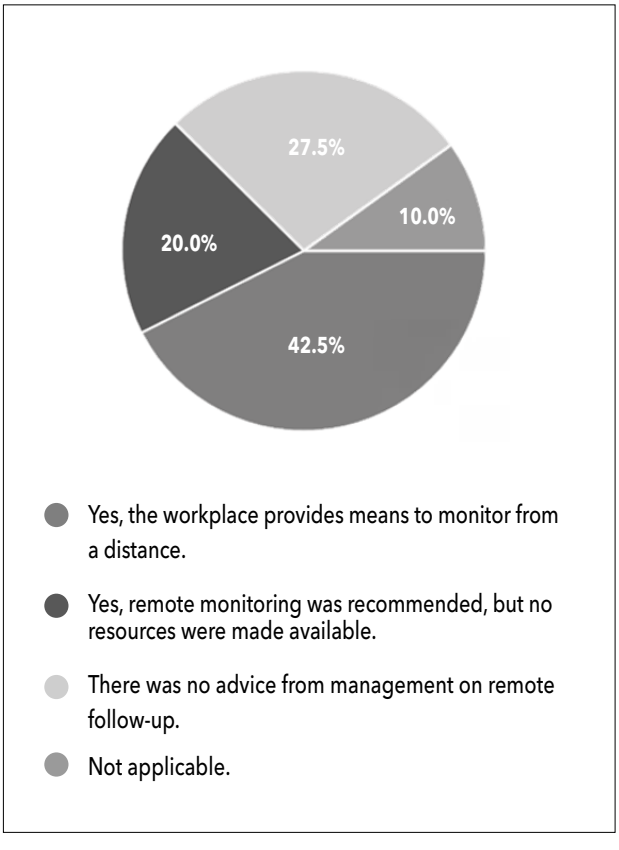

Figure 3 - Data on remote follow-up of suspended appointments due to the COVID-19 pandemic.

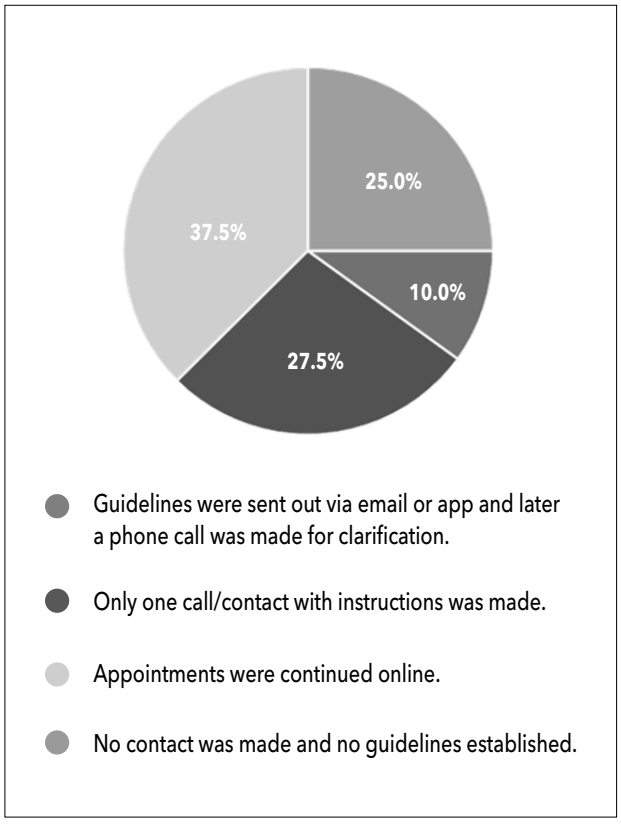

Figure 4 - Measures taken by physiotherapists during the COVID-19 pandemic.

Discussion

The data from the present study revealed that 72% of in-person appointments were discontinued, with the greatest impact on homecare. This result showed that the population strongly followed the WHO recommendations regarding social isolation, even if this implied a worsening in their patients' health condition. With respect to the suspension of in-person care, a similar result was found by Minghelli et al.,[14] who evaluated 619 generalist physical therapists in Portugal, 453 of whom (73.2%) interrupted their in-person activities, but used digital tools to monitor patients.

According to the ABFO website, most physical therapists specialized in oncology are from the southeast of the country. Nevertheless, this study included several professionals working in the northeast region. All the specialists were contacted via email; however, only a small number completed the questionnaire. Positive feedback was given primarily by physiotherapists from the northeast. Non-specialist professionals who treat breast cancer patients were also invited through social networks. It is important to point out that the authors are from the northeast, and have greater knowledge about the people from that region, which may also explain these results. With a view to improving patients' clinical conditions as well as minimizing the exposure of professionals, patients and those involved in the care process, the ABFO and the Brazilian Association of Physiotherapy in Women's Health (ABRAFISM) recommended the suspension of in-person care for stable patients (provided it did not compromise functionality) and remote support measures through teleservice or home exercise prescription.[15,16] These measures were also adopted by other international organizations, such as the World Confederation for Physical Therapy, and the Federal Council of Physiotherapy and Occupational Therapy (COFFITO), through Resolution No. 516 from March 20, 2020, which allowed off-site care in teleconsultation, teleconsulting and telemonitoring.[17]

Telerehabilitation has been shown to be a promising model, providing several benefits.[18,19] Most professionals (90%) in the present study adhered to some form of digital monitoring, from teleconsultation, with live assistance and video calls (37.5%), to follow-up calls by telemonitoring after instructions were sent by e-mail (10%), or only with routine calls for guidance (25%).

Areas where telerehabilitation programs were implemented as a strategy during the pandemic have shown a high level of acceptance and satisfaction by patients and physiotherapists, and have obtained satisfactory results in reducing postoperative breast complications, proving to be an effective tool in lessening the damage caused by the interruption of physical therapy.[20]

Despite the good results reported in literature, in this study, 60% of patients whose in-person care was replaced by telerehabilitation reported a worsening of their clinical condition. This can be explained by the advanced stage at which the Brazilian population is diagnosed in relation to populations in developed countries, requiring aggressive cancer treatments and culminating in complications that are more difficult to treat, thereby increasing the need for in-person follow-up.[21]

Advanced disease staging may also explain the fact that 55.2% of physiotherapists who resumed treating women with breast cancer observed the

same complications and complaints when compared to patients treated at other times.

In Brazil, it was recommended that the pandemic should not affect or postpone cancer screening and treatment. However, there was a decline of up to 60 and 56% in diagnoses and surgical treatment, respectively, caused mainly by the patients' fear of exposure to the virus during medical visits and the reduced response capacity of health services in public hospitals, due to the priority given to COVID-19 patients.[8,22] The results of the present study corroborate these data, since 25% of professionals in the sample were relocated from their sector to the front lines of COVID-19 care, thereby contributing to the interrupted care of women with breast cancer.

In the United Kingdom and several other countries, cancer screening was also suspended due to the drastic drop in referrals caused by the priority treatment for COVID-19 patients, reduced medical visits, postponed imaging examinations to monitor tumor growth, in addition to decreasing elective surgeries. This severely affected cancer diagnosis, active treatments and routine follow-ups, possibly leading to worsened health conditions, advanced stages of cancer and higher treatment costs.[23] In Turkey, on the other hand, studies show no delay in 98% of treatments or consultations in progress, probably due to the implementation of care strategies through online platforms and the priority to maintain on-going treatments, despite users' reporting changes in their daily routine.[21]

In spite of the limitations surrounding online care, this type of service has proven to be a beneficial option for providing long-term physical therapy, since patients can be observed in their home environment and their ability to modify and execute self-management strategies assessed. Moreover, the patients' functional mobility can be monitored using their own means and equipment, providing them with continuous feedback and supervision.[24] Given the results of this research, the limitations involving this modality of care may be related to the lack of counseling and training provided by managers to professionals, since only 20% provided advice on distance monitoring, but with no support, and 27.5% abstained from any counseling.

According to the findings and complications created by the suspension of care for breast cancer patients during the pandemic, there is currently a need to emphasize an interdisciplinary approach to breast cancer care. Rehabilitation is essential because it plays an important role from the preoperative to postoperative phase, from the monitoring or functional recovery of the upper limbs and shoulder girdle to the prophylaxis and treatment of complications such as adhesions and lymphedemas and, consequently, in the reintegration of women into their daily activities.[5,24]

Telerehabilitation may be an excellent tool, but there is a lack of training and encouragement from management for its satisfactory use, as seen in the present study, where almost 1/3 of professionals did not receive any advice or instructions on remote care or developing guidelines that could help in women's rehabilitation.

Conclusion

Due to the social isolation recommended by the WHO as a measure to control the pandemic, as well as the relocation of professionals to the front lines of COVID-19, most physical therapists discontinued their care of breast cancer patients. The suspension of in-person treatment, non-adherence to the telerehabilitation system, lack of management support, and the advanced stage when breast cancer is diagnosed are all factors that may influence the worsening of patients' clinical condition. However, since this is an unprecedented study in Brazil, at the time of this research there was no comparative data for the variables analyzed, which we consider a limitation. It is suggested that further studies be carried out to analyze the effects of suspending health services, as well as the impact of telerehabilitation on the clinical condition of Brazilian women with breast cancer.

Authors' contribution

BAAP, CKDD and CWSF were equally responsible for the conception, design, analysis and interpretation of data. BAAP wrote the manuscript and CKDD and CWSF revised and approved the final version.

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Prevalence and factors associated with urinary incontinence in women farmers

Prevalência e fatores sociados à incontinência urinária em agricultoras

Priscila Roman
Vanessa Spinelli
Ana Paula Maihack Gauer
Franciane Barbieri Fiório
Ana Cristina Mucke
Viviane Jacintha Bolfe Azzi*

Universidade do Oeste de Santa Catarina (UNOESC), São Miguel do Oeste, SC, Brazil

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*** Correspondence:** viviane.azzi@unoesc.edu.br

Abstract

Introduction: Urinary incontinence (UI) is any involuntary loss of urine, exhibiting a relationship with pelvic floor muscle weakness and overload. The physical exertion required of the woman farmer may predispose her to higher frequency of UI. **Objective:** To evaluate the prevalence of UI and associated factors in women farmers. **Methods:** Cross-sectional study, with application of an evaluation form and the International Consultation on Incontinence Questionnaire - Short Form (ICIQ-SF) in women aged between 25 and 50 years old. Women with urinary loss responded to the King's Health Questionnaire (KHQ). Data were collected by individual interview. The data were analyzed by absolute and relative frequency, using the Mann-Whitney test for intergroups and Spearman's Correlation Coefficient to relate the variables, considering $p < 0.05$. **Results:** Two hundred farmers were interviewed, where 52 (26%) reported involuntary urine loss. The incontinent group had a higher number of annual urinary infection (3.23 ± 1.40). Most incontinent women reported escape 1x/week or less (73.08%), in small amounts (82.69%), during stress (57.69%). Quality of life was classified as very good by 59.62%. The intensity of the work was considered strong by 25% of the incontinent women. Only 30.5% of the volunteers were able to define UI and 97.7% considered it not normal. **Conclusion:** The prevalence of UI was equivalent to the average of the female population in general, with urinary infection as an associated factor. The loss occurs mainly to stress, and lack of knowledge can reflect in the identification treatment.

Keywords: Agriculture. Farmers. Urinary incontinence. Women.

Resumo

Introdução: *Incontinência urinária (IU) é qualquer perda involuntária de urina, apresentando relação com sobrecarga e fraqueza da musculatura do assoalho pélvico. O esforço físico exigido da mulher agricultora pode predispor à maior frequência de IU.* ***Objetivo:*** *Avaliar a prevalência e fatores associados à IU em mulheres agricultoras.* ***Métodos:*** *Estudo de corte transversal, com aplicação de ficha de avaliação e do* International Consultation on Incontinence Questionnaire – Short Form *(ICIQ-SF) em mulheres com idade entre 25 e 50 anos. As mulheres com perda urinária responderam ao* King's Health Questionnaire *(KHQ). A coleta de dados foi por entrevista individual. Os dados foram analisados por frequência absoluta e relativa, sendo empregado o teste de Mann-Whitney para intergrupos e o coeficiente de correlação de Spearman para relacionar as variáveis, considerando p < 0,05.* ***Resultados:*** *Duzentas mulheres agricultoras foram entrevistadas, das quais 52 (26%) referiram perda involuntária de urina. O grupo incontinente apresentou maior número de infecção urinária anual (3,23 ± 1,40). A maior parte das mulheres incontinentes referiram escape 1x/semana ou menos (73,08%), em pequena quantidade (82,69%) e durante o esforço (57,69%). A qualidade de vida foi classificada como muito boa por 59,62%. A intensidade do trabalho foi considerada forte por 25% das mulheres incontinentes. Apenas 30,5% das voluntárias souberam definir IU e 97,7% consideram não ser normal.* ***Conclusão:*** *A prevalência de IU foi equivalente à média da população feminina em geral, tendo a infecção urinária como fator associado. A perda ocorre principalmente por conta de esforços e a falta de conhecimento pode dificultar a identificação e procura por tratamento.*

Palavras-chave: *Agricultura. Agricultoras. Incontinência urinária. Mulheres.*

Introduction

Urinary incontinence (UI) is defined by the International Continence Society (ICS) as any involuntary loss of urine,[1] and may cause psychosocial and economic interference, in addition to affecting quality of life (QoL).[2] The prevalence of UI in women worldwide varies from 5 to 69%1 and, in Brazil, between 5.8 and 72%.[3] These data consider all types of UI and are likely influenced by methodological, cultural and perceived dysfunction differences.

Its greater prevalence in women is due to their pelvic anatomy, frailty index of the pelvic floor muscles (PFMs), age-related bladder capacity, and changes associated with parity and pelvic trauma.[4] Additional risk factors include neurological diseases, diabetes, hypertension, smoking, caffeine consumption, pelvic and abdominal surgery, use of antihypertensive drugs, obesity and constipation.[5]

UI can affect the social, family and work life of women and may be accompanied by comorbidities such as urinary infections, perineal dermatitis, irritation, itching, and loss of libido, among others. This causes embarrassment, sadness, anxiety, depression and marital problems, which has a negative effect on QoL.[6]

Lack of information on UI means that many women do not recognize it as a health problem, but something normal and inherent to aging.[7] The greater social vulnerability of the rural population and the difficult access of professionals limit the dissemination of health information,[8] and could increase the frequency of unidentified dysfunctions. Low schooling level may also be a complicating factor in the search for and interpretation of health information. According to the 2017 agricultural sector, approximately 15% of Brazilian farmers have never attended school.[9]

Although UI has a negative influence on the life of women, few seek professional help at the first signs of dysfunction. This is due primarily to embarrassment and lack of knowledge about dysfunction, associated with cultural and family influences.[10]

In Brazil, the number of farms where the producer is a woman has risen from 12.7 to 18.6% in recent years.[9] This indirectly indicates their growing participation in rural activities. Agriculture is one of the most economically important activities in the country and, due to the demand for labor, women carry out both domestic and child care activities and agricultural services on the farm,[11] where the excess workload may predispose them to dysfunctions.

Thus, it is important to assess the prevalence of UI and associated factors in women farmers, assuming that the peculiarities of rural work overload PFMs and the lack of information on this dysfunction hinders their seeking treatment.

Methods

This is a cross-sectional study using quantitative analysis conducted in a rural area of the municipality of São José do Cedro, in western Santa Catarina state. The

project was approved by the ethics committee (protocol no. 4.250.511) and the procedures complied with the human research guidelines of National Health Council Resolution no. 466/2012.

The sample consisted of 200 women farmers aged between 25 and 50 years, working on a rural property for at least 8 hours a day, who perceived no changes in their menstrual cycle and were not pregnant. For sample selection, information was obtained from community health agents. Data were collected at the home of the selected women in order to prevent the need to travel from being a hindering factor. Individual interviews were held without the presence of any other family member, as follows:

a) Assessment chart: consisting of personal data, height, weight, general health information, urogynecological history, work routine on the farm and knowledge of UI.

b) International Consultation on Incontinence Questionnaire – short form (ICIQ-SF): Portuguese version consisting of three questions on the frequency and volume of urinary loss and their interference in QoL. The final score is the sum of the points of each question, classifying UI as mild (1 - 3 points), moderate (4 - 6 points), severe (7 - 9 points) and very severe (≥ 10 points).[12]

c) Health questionnaire (Portuguese version of King's Health Questionnaire - KHQ): applied only to women reporting urinary escape. This questionnaire measures the impact of UI on health status and QoL, and contains 30 questions and 9 domains (health perception, impact of UI, limited task performance, physical limitations, social limitations, personal relationships, emotions, sleep/energy and measures of severity). A numerical value is assigned to each response and the sum varies from 0 to 100, considering that the higher the number obtained, the worse the QoL. A Likert-type scale was used to classify QoL as very good (0 - 20 points), good (21 - 40 points), fair (41 - 60 points), poor (61 - 80 points) or very poor (81 - 100 points).[13]

Statistical analysis

The data were analyzed by absolute and relative frequency, dividing the sample into two groups: continent (CG) and incontinent (IG). The Mann-Whitney test was used for intergroup comparison and Spearman's correlation coefficient to relate the factors with the presence of UI. All the tests were processed in Bioestat 5.0 software, considering $p < 0.05$.

Results

Involuntary urine loss was reported by 52 women farmers (26%). Table 1 presents the sample characteristics. No intergroup differences were observed in age and anthropometric variables.

Table 1 - Sample characterization

	CG	IG	p
Age (years)			
25 - 30	26.81 ± 2.00	27.72 ± 1.80	0.08
31 - 39	35.06 ± 2.50	35.0 ± 2.42	0.49
40 - 50	45.16 ± 3.31	46.07 ± 3.40	0.11
Weight (kg)	70.25 ± 12.60 (42 - 119)	73.23 ± 16.20 (48 - 123)	0.13
Height (meters)	1.62 ± 0.10 (1.49 - 1.82)	1.61 ± 0.10 (1.49 - 1.72)	0.50
BMI (kg/m²)	26.64 ± 4.60 (18.13 - 43.71)	28.07 ± 6.10 (18.37 - 50.54)	0.09
Marital status			
Single	12 (8.11%)	4 (7.69%)	
Married	133 (89.86%)	47 (90.38%)	0.48
Divorced	2 (1.35%)	1 (1.92%)	
Widow	1 (0.68%)	0 (0%)	
Schooling			
IES	53 (35.81%)	22 (42.31%)	
CES	17 (11.49%)	7 (13.46%)	
ISS	11 (7.43%)	3 (5.77%)	
CSS	54 (36.49%)	19 (36.54%)	0.21
IUD	3 (2.03%)	0 (0%)	
CUD	5 (3.38%)	1 (1.92%)	
GD	4 (2.70%)	0 (0%)	
NS	1 (0.68%)	0 (0%)	
Number of pregnancies	2.18 ± 1.02 (1 - 6)	2.67 ± 1.55 (1 - 10)	0.07
Nulliparous	19 (12.84%)	6 (11.54%)	0.47
Hypertension	12 (8.11%)	7 (13.46%)	0.31
Depression	7 (4.73%)	5 (9.62%)	0.28
Anxiety	5 (3.38%)	4 (7.69%)	0.31
Physical exercise	29 (19.59%)	5 (9.62%)	0.16
Healthy eating habits	66 (44.59%)	22 (42.31%)	0.47

Note: CG = continent group (n = 148); IG = incontinent group (n = 52). BMI = body mass index; IES/CES = incomplete/complete elementary school; ISS/ICSS = incomplete/complete secondary school; IUD/CUD = incomplete/complete university degree; GD = graduate degree; NS = no schooling.

With respect to schooling level, 42.31% of the IG and 35.81% of the CG have incomplete elementary school, with most only completing grade four.

The number of pregnancies did not differ between the groups. The IG exhibited more comorbidities with continuous treatment (40.38%), the most common being hypertension (13.46%), depression (9.62%) and anxiety (7.69%). The CG engaged in regular physical exercises (19.59%) and healthy eating habits (44.59%) with greater frequency than the IG.

Table 2 shows that both groups work an average of 10 hours a day on agricultural activities, with 55.77% of the IG classifying work intensity as moderate and 25% as high. In the CG, 67.57% consider it moderate and 13.51% high. More than 60% of women farmers, irrespective of group, report carrying loads of 15 kg or more for approximately one hour.

Table 2 - Characterization of the work and urogynecological history of women farmers

	Continent group (n = 148)	**Incontinent group (n = 52)**	**p**
Hours/day worked	10.34 ± 1.62 (8 - 12)	10.31 ± 1.74 (8 - 12)	0.49
Work intensity			
Mild	27 (18.24%)	9 (17.31%)	
Moderate	100 (67.57%)	29 (55.77%)	0.10
High	20 (13.51%)	13 (25.00%)	
Very high	1 (0.68%)	1 (1.92%)	
Most frequent position			
Sitting	4 (2.70%)	1 (1.92%)	
Standing	20 (13.51%)	9 (17.31%)	0.38
Walking	124 (83.78%)	42 (80.77%)	
Time in the same position (hours)	4.78 ± 1.58 (1 - 8)	4.65 ± 1.80 (1 - 8)	0.40
Load carried per day at one time (kg)			
0 - 5	56 (37.84%)	17 (32.69%)	
5 - 10	1 (0.68%)	2 (3.85%)	0.35
10 - 15	2 (1.35%)	1 (1.92%)	
> 15	89 (60.14%)	32 (61.54%)	
Time carrying weight per day (hours)			
1	124 (83.78%)	41 (78.85%)	
1 - 2	21 (14.19%)	9 (17.31%)	0.31
3 - 4	3 (2.03%)	1 (1.92%)	
4 - 5	0 (0%)	1 (1.92%)	
Activities on the property			
Domestic tasks	148 (100%)	52 (100%)	
Milking cows	123 (83.11%)	45 (86.54%)	
Vegetable gardening	85 (57.43%)	40 (76.92%)	0.31
Landscaping	14 (9.46%)	6 (11.54%)	
Cheese production	1 (0.68%)	1 (1.92%)	
Milking parlor infrastructure (n = 168)			
Bucket	72 (58.54%)	32 (71.11%)	0.06
Trench	51 (41.46%)	13 (28.89%)	
Knows what urinary incontinence is	44 (29.73%)	17 (32.69%)	0.37
Thinks urinary incontinence is normal	1 (1.92%)	1 (0.68%)	0.45
Daily urinations	6.28 ± 2.46 (2 - 20)	7.15 ± 3.87 (2 - 20)	0.19
Nighttime urinations	0.51 ± 0.69 (0 - 3)	0.75 ± 0.97 (0 - 4)	0.11
Constipation	25 (16.89%)	8 (15.38%)	0.43
Number of pregnancies	2.05 ± 0.95 (1 - 6)	2.37 ± 1.02 (1 - 6)	0.12
Type of delivery			
Vaginal	42 (32.56%)	17 (36.56%)	
Cesarean	61 (47.29%)	23 (50.00%)	
Vaginal and cesarean	26 (20.16%)	6 (13.04%)	0.23
Vaginal with episiotomy	61 (49.59%)	19 (41.30%)	
Vaginal with forceps	8 (6.50%)	0 (0%)	
Frequent urinary infection	7 (4.73%)	13 (25.00%)	0.01
Number of urinary infections/year	2.14 ± 0.90 (0 - 3)	3.23 ± 1.42 (0 - 6)	0.01
Gynecological surgery	18 (12.16%)	12 (23.08%)	0.09
Tubal ligation	7 (4.72%)	5 (9.62%)	0.25
Uterine surgery	4 (2.70%)	4 (7.70%)	0.37
Ovary removal	7 (4.72%)	3 (5.77%)	0.42
Endometriosis	1 (0.68%)	2 (3.85%)	0.21

Regardless of the group, more than 80% of women walked continuously on average for four hours, and the main activities performed involved milking and vegetable gardens, in addition to domestic tasks. A total of 71.11% of women farmers from the IG who work with milk production use a "bucket system", where the person squats to connect the milking machine, and 28.89% a" trench" system where they remain standing during the procedure. In the CG, 58.54% use the former system and 41.46% the latter. Women also help treat animals and work in the fields building fences, and planting cassava, potato, onion, beans, maize and soybean.

When asked to define UI, 61 (30.5%) of the women answered "loss of urine", "being unable to hold back urine", "when urine escapes", and most (97.7%) considered involuntary urine loss abnormal. Only two (3.84%) of the 52 incontinent women reported dysfunction to their doctor and are waiting for surgery.

The frequency of constipation, as well as the number of urinations and deliveries did not differ between the groups. Cesarean section was the most commonly performed delivery in the IG (50%), followed by vaginal delivery with episiotomy (41.30%); in the CG, the greatest frequency was vaginal delivery with episiotomy (49.59%), followed by cesarean section (47.29%).

The IG women reported higher frequency of urinary infections (25%) and more episodes per year (3.23 ± 1.42). Although not significant, the frequency of gynecological surgeries was higher in the IG (23.08%) than the CG (12.16%), as well as the presence of endometriosis (3.85%).

With respect to ICIQ-SF data, most of the incontinent women experienced a small amount (82.69%) of urinary loss 1x/week or less (73.08%), and more prevalent in activities such as coughing, sneezing, lifting heavy weight and physical activity, classified as stress incontinence (SI) (57.69%), followed by mixed UI (MUI) (26.92%), which are exertion losses and those in situations of a sudden strong urge to urinate, where leaks occur before reaching the bathroom, typical of urge urinary incontinence (UI), whose prevalence was 15.38%. In relation to the impact of UI on the QoL of incontinent women assessed by the ICIQ-SF, 15.38% reported low interference (score = 2), 38% medium (score = 5) and 13.46% high (score = 8). With respect to severity, 9.59% of the incontinent women were classified as mild, 25% moderate, 34.62% severe and 30.77% very severe (Table 3).

Table 3 - Absolute and relative frequency of the International Consultation on Incontinence Questionnaire - Short Form (ICIQ-SF) responses given by the incontinent women farmers (n = 52)

Questions	n (%)
Frequency of urinary loss	
1 x/week or less	38 (73.08)
2 - 3 x/week	7 (13.46)
1 x/day	2 (3.85)
Several times a day	5 (9.62)
Amount of urinary loss	
Small	43 (82.69)
Moderate	7 (13.46)
Large	2 (3.85)
Impact of urinary incontinence	
0 (little interference)	5 (9.62)
1	1 (1.92)
2	8 (15.38)
3	5 (9.62)
4	6 (11.54)
5	8 (15.38)
6	2 (3.85)
7	4 (7.69)
8	7 (13.46)
9	3 (5.77)
10 (high interference)	3 (5.77)
Urinary incontinence score	
Mild (1 – 3)	5 (9.52)
Moderate (4 – 5)	13 (25.00)
Severe (6 – 9)	18 (34.62)
Very severe (> 10)	16 (30.77)
Classification of urinary incontinence	
Before reaching the bathroom (urge)	8 (15.38)
Coughing/sneezing/physical activity (stress)	30 (57.69)
Mixed (urge and stress)	14 (26.92)

Table 4 presents the KHQ result, where 59.62% of the incontinent women obtained a QoL classification of very good, 25% good and 15.38% fair.

Table 5 shows that UI exhibited a weak positive correlation with urinary infection, indicating urinary infection frequency as a predisposing factor for UI in this population. In addition, there was a strong negative correlation between UI severity and QoL, underscoring the negative impact of UI. The variables related to the women farmers' work showed no correlation with UI.

Table 4 - Absolute and relative classification of the quality of life of incontinent women farmers (n = 52), obtained by King's Health Questionnaire

King's Health Questionnaire	
Very good (80-100 points)	31 (59.62%)
Good (60-80 points)	13 (25.00%)
Fair (40-60 points)	8 (15.38%)
Poor (20-40 points)	0 (0%)
Very poor (0-20 points)	0 (0%)

Table 5 - Correlation between the presence of UI and the other health variables of incontinent women farmers (n = 52) and the ICIQ-SF and KHQ questionnaires

Variables	rs	p
UI x Urinary infection	0.32	0.001
ICIQ-SF x KHQ	-0.84	0.001
UI x Work intensity	0.09	0.164
UI x Hours worked	-0.007	0.923
UI x Weight carried	0.02	0.742
UI x Physical exercise	-0.10	0.142
UI x Milking parlor infrastructure	0.18	0.214

Note: UI = urinary incontinence; ICIQ-SF = International Consultation on Incontinence Questionnaire - Short Form. KHQ = King's Health Questionnaire; rs = Spearman's correlation coefficient.

Discussion

The present study showed 26% prevalence of UI in female farmers aged between 25 and 50 years. Urine loss occurred in situations that characterized SI (57.69%) and MUI (26.9%). These results are similar to those described below from other countries, since no Brazilian studies were found on UI prevalence in the rural population.

According to Biswas et al.,[14] the prevalence of UI in a study carried out with 177 women aged 50 years and older, treated at a rural health unit in Western Bengala, India, was 27.7%, the most common being SI (51%), followed by MUI (32.7%) and UUI (16.3%). The authors concluded that female farmers exhibit high risk of developing UI, since most did not seek treatment for the dysfunction, which is a reason for concern. The authors reported that awareness of UI may help increase the search for better health conditions and QoL. It is important to note that although the maximum age in the present study was 50 years, prevalence was similar to that of Biswas et al.,[14] which demonstrates the development of UI in younger women and the importance of early identification of the dysfunction.

Ganapathy[6] conducted a study with 611 women aged 19 years and older living in rural Bangalore, India, and found 23.08% with UI. Most (54.61%) exhibited SI, followed by MUI (27.66%) and UUI (17.73%), being more common in those older than 40 years (59.57%).

The increase in UI with age is generally related to a decrease in hormone levels, decline in bladder contractility and progressive loss of pelvic floor muscle strength, thus reducing their capacity to maintain intraurethral pressure during bladder filling, leading to involuntary urinary loss, especially during exertion.[15] Age is a known risk factor for UI, but this was not observed in the present study.

The lower prevalence of healthy eating habits and greater frequency of depression and anxiety found in the IG reveals the influence of these factors. Maintaining a healthy eating routine has numerous benefits for health, including the prevention of possible diseases.[16] Regular physical exercise improves mood and well-being, reduces anxiety and stress, enhances physical disposition and improves the functioning of body systems.[17] In a study by Melotti,[18] where 274 women diagnosed with UI, moderate or severe depression or anxiety was present in 59.8% of the women and moderate or severe anxiety in 62.4%. The study showed a significant correlation between UI and mental disorders.

Lamerton et al.[19] assessed the responses of 8457 women aged between 22 and 27 years using an online questionnaire, identifying UI prevalence of 11.7%, relating it to factors such as higher weight, lower physical activity level and greater psychological suffering. The authors emphasize the strong relationship between UI and psychological changes, indicating the possible bidirectional association between dysfunctions that can be explained by the decline in serotonin levels and/or increased activation of the hypothalamus-hypophysis axis or the sympathetic nervous system.

With respect to the BMI of the present study, the average values of the two groups classified them as overweight. A Swedish study found an increased UI risk in obese women, with results more than twice as high when compared to those with normal BMI.[20] The authors report that accumulated abdominal fat can increase intra-abdominal pressure transmitted to the

bladder, facilitating urinary loss.[21,22] Increased weight in the waist/hip region may compromise MAP contraction capacity in situations of higher intra-abdominal pressure, hindering its contribution to an effective urethra closure mechanism and favoring escape.[23] However, despite the high BMI, the female farmers walked continuously during most of their work activities, and given the non-significant intergroup difference in BMI, it is suggested that movement may be a compensating factor.

In light of the increased life expectancy, obesity, depression and anxiety indices[22] and the relationship between these conditions and UI, there is an urgent need to discuss these factors in health education, since even a small urinary loss affects daily habits, such as a decline in physical activity, the use of a protector and sleep disturbances caused by rising several times to use the bathroom, aggravating factors in weight gain and psychological suffering.[19]

In addition to the aforementioned comorbidities, hypertension was also more frequent in the IG. Recent studies indicate this comorbidity as a significant risk factor for UI.[14,22,24] On the other hand, neither diabetes mellitus[14,22] nor chronic cough[14,23,24] was observed in the study population, comorbidities strongly related to UI in earlier studies. The association between UI and different comorbidities demonstrates the need for more investigations aimed at establishing the cause-and-effect relationships that allow early, more assertive interventions.

Masenga et al.[25] investigated the prevalence of UI in 1048 women from the rural zone of Kilimanjaro, Tanzania, aged between 18 and 90 years, and found that 42.1% of the women interviewed exhibited some type of UI: 39% with symptoms of SI, 22 % UUI and 39% MUI. The study also found that women with no formal education were more prone to developing UI. In the present study, most of the women had not completed elementary school.

The studies conducted by Casey et al.[26] and Demircan et al.[27] confirmed that older women living in rural areas in Asia had a more vulnerable socioeconomic situation and poorer living conditions, little accessibility to health services and lack of knowledge regarding UI. For these reasons, the authors believe that this lack of knowledge and poor accessibility are the primary factors responsible for the higher prevalence of UI in this population. In the present study, only 30.5% of the women claimed to have some knowledge of the issue, confirming the lack of knowledge about the signs and symptoms of this dysfunction, as well as little understanding of pelvic floor muscles, revealing the limitation of the population in terms of health education and awareness of the disease.

The work of women farmers involves significant physical exertion.[10] In this study, UI showed no statistical correlation with the rural work variables analyzed, such as intensity, position maintained, weight carried, time carrying weight and activities performed. Masenga et al.[25] also found a relationship between UI and hours carrying weight in women from a rural zone of Tanzania. It is important to note, however, that perceived work intensity was higher in the IG than CG, perhaps because they identified urinary loss during exertion.

Most of the IG women responsible for milking cows used a bucket in the squat position during the procedure. According to Carvalho,[28] this position provides strong pelvic stabilization, trains balance, prevents lumbar pain and strengthens lower limbs. On the other hand, the squat position, especially if the hips are rotated internally, helps open the pelvic outlet,[29] which increases traction on the PFM. Thus, even if the position adopted benefits the pelvic region, when executed with biomechanical compensation and/or one PFM unprepared to maintain the position, it may overload this muscle and cause urinary symptoms.

The number of pregnancies and deliveries, as well as the characteristics of the latter did not differ between the groups, highlighting the non-obligatory relationship between these variables and prevalence of UI.[30] Albeit not significant, the relative frequency of gynecological surgeries was greater in the IG. These procedures may affect the integrity of bladder innervation and the PFMs, as well as the integrity of the urethral sphincter, compromising voluntary urinary control.[31] In addition, the report of frequent urinary infections was higher in the IG (25%), exhibiting a direct relationship between the number of annual infections and UI severity. In a study of rural women with UI, Ganapathy[6] found that 37.59% suffered from frequent urinary tract infections. Women are more vulnerable to urinary infections, since their urethra is narrower and due to the closer proximity between the vagina and anus when compared to men, which facilitates the presence of an infectious agent.[32] With repeated urinary infections, the bladder becomes hyperactive because of inflammation on its inner surface. Using an absorbent pad (often adopted to avoid wetting clothes) provides a favorable environment for the proliferation of fungi and bacteria.[5,33] In addition, poor

urinary habits such as prolonging urination, urinating while semi squatting, hindering PFM relaxation or proper hygiene during bladder emptying may become routine, given the distance between the home and the rural task, creating favorable conditions for urinary tract infection. Risk factors for urinary infection may be behavioral, anatomic or genetic, and the population and individual ability to adapt preventive and prophylactic strategies should be considered.[34] This demonstrates the need to investigate cases of frequent urinary infections, since, when the transitory causes are corrected, UI symptoms can be resolved.[35]

With respect to the perceived impact of UI on QoL, analyzed by the ICIQ-SF, nearly 50% reported little or medium interference. This finding may be due to the small amount of urine lost and low frequency reported. Nevertheless, the ICIQ-SF score demonstrated that 34.62% exhibited severe symptoms. Similar results were found in a study conducted by Treister-Goltzman and Peleg.[33]

The perceived impact of UI on QoL reveals the lack of knowledge about this dysfunction and the problems caused by its evolution, as well as its causes and impacts on the life of women. The limited knowledge about the disease is an important risk factor for the evolution of the clinical picture. The KHQ showed that the perceived QoL of the IG is fair to very good. On the other hand, the more severe the UI determined by the ICIQ-SF, the lower the QoL indicated by the instrument. Although UI is not considered a significant cause of morbidity or mortality, its presence has a negative impact on the QoL of women,[31] regardless of hormonal status,[36] involving physical, social, professional, sexual and emotional aspects.[37,38] On the other hand, it is intriguing to observe how naturally the female farmers learn to live with UI, reporting that it does not compromise their daily activities or interpersonal and/or sexual relationships. In this respect, it is important to note that when asked, most of the women recognize involuntary loss as something abnormal. However, few women sought professional help (3.84%) when compared to studies conducted in Australia (18.9%),[19] Pakistan (11.3%),[24] Israel (10%)[33] and India (30.6%),[14] the last exclusively with women living in rural areas.

Higa et al.[21] suggest that the low incidence of seeking treatment occurs mainly because women suffering urinary loss prefer to conceal the disorder, because it hinders interpersonal interactions, a stigma that compromises the search for treatment. Corroborating the authors, the women of the present study demonstrated reluctance and embarrassment when discussing the issue, despite their not deeming UI an inconvenience. Other reasons described in the literature are that urine loss affects all women and is therefore not considered a problem,[19,24] expectation of spontaneous recovery[19,24] and believing that urine loss is incurable.[14,24] These reports demonstrate that seeking assistance is determined by the women's beliefs and lack of knowledge about its progression and treatment possibilities, interfering in the attention given to the problem.

It is believed that the vast majority of women farmers (97.7%) recognizing UI as something abnormal has been influenced by the object of the study, reinforcing the conclusion by Oliveira et al.[39] that the population in general does not consider UI a disease, but demonstrating that addressing the topic, even in a research setting, may change the conception of their health condition and trigger the need to remedy it. Lamerton et al.[19] report that health professionals are in a privileged position for early identification of women with greater risk of UI and to discuss prevention and treatment strategies, provided they are properly trained and informed.

Demystifying the pre-established concepts of UI, which includes health-related questions at routine medical checkups, viewing complaints with empathy, informing patients on the progression of signs and symptoms, denaturalizing the dysfunction and indicating treatment possibilities, mainly involving prevention, are urgent measures that should be implemented in health care programs, remembering to consider the particularities of the population treated.

Conclusion

The prevalence of UI in female farmers was similar to that reported in other countries. Urinary loss occurs especially during exertion activities such as coughing, sneezing and carrying weight. Incontinent women experience more annual urinary infections. Other factors are the influence of pelvic surgery, comorbidities and sedentary behavior in the presence of UI.

Agricultural work characteristics showed no correlation with the appearance of urinary symptoms. Constant movement, especially walking, may be a protective factor that counterbalances risk factors such as high BMI and the amount of weight carried daily,

which were observed in both groups. On the other hand, assessing PFM activation in the squat position during bucket milking might clarify the relationship with the greater frequency of this system in the IG.

Lack of knowledge about UI may justify the low or medium interference of this dysfunction in QoL, despite the predominance of the "severe" score. Other factors that may have an influence and deserve more specific investigation are the embarrassment and reluctance of women to talk about the issue, since the greater the UI severity, the worse the QoL.

It is important to underscore the importance of addressing the problem, as well as other specific health issues affecting women farmers, in order to encourage greater care of their own body. Although the vast majority consider urine loss abnormal, few sought medical assistance. This approach will likely facilitate the early identification of dysfunctions and ensure adequate dignified treatment, thereby improving self-esteem, quality of life, work satisfaction and appreciation of rural life.

Authors' contributions

All the authors contributed substantially to the conception of this manuscript. PR, VS and VJBA were responsible for the conception, methodology, data collection, analysis and interpretation, writing of the article and final approval. APMG, FBF and ACM contributed to the methodology, data analysis and interpretation, critical revision of the article and final approval.

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Knowledge of pelvic floor disorders in young women: a cross-sectional study

Conhecimento dos distúrbios do assoalho pélvico em mulheres jovens: um estudo transversal

Caroline Baldini Prudencio [1]
Guilherme Thomaz de Aquino Nava [2]
Bruna Rosa de Souza [3]
Aline Medolago Carr [1]
Raissa Escandiusi Avramidis [1]
Angélica Mércia Pascon Barbosa [1,3*]

[1] Universidade Estadual Paulista (UNESP), Botucatu, SP, Brazil
[2] Universidade Estadual Paulista (UNESP), Rio Claro, SP, Brazil
[3] Universidade Estadual Paulista (UNESP), Marília, SP, Brazil

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*** Correspondence:** angelicapascon@gmail.com

Abstract

Introduction: Young women's knowledge about pelvic floor function and dysfunction are poor. **Objective:** To identify the level of knowledge of young women about pelvic floor muscles (PFM) anatomy and function, pelvic floor muscle dysfunction (PFMD), pelvic organ prolapse (POP), and sexual dysfunction (SD). **Methods:** This is a cross-sectional study. Two hundred forty-two (242) young women from first to the third year of high school from ten public schools, in geographically disparate areas of a Brazilian county serving economic minority student populations, participated in the study. Data analysis was performed using SPSS 20.0 (SPSS Inc., Chicago, IL). The categorical data were expressed as absolute and relative frequency. **Results:** Only 28% of the young women knew PFM, and 26% answered to be able to contract these muscles. The prevalence of urinary incontinence was 16%, while 5% reported fecal incontinence. The previous knowledge about POP was similar between bladder and uterus prolapse, 34% and 40%, respectively. SD was known by 48% of the young women. Seventy-seven young women (31.8%) declared to have had sexual intercourse. Ten percent declared difficulties to allow vaginal penetration, and 48% of those who were able to have penetration declared that they experienced pain and discomfort. **Conclusion:** Young women have little knowledge about the PFM anatomy and function, PFMD, POP, and SD. In addition, they have complaints related to sexual practice, such as difficulty during vaginal penetration and pain.

Keywords: Adolescent. Health education. Pelvic floor disorders. Primary prevention. Women's health.

Resumo

Introdução: *O conhecimento de mulheres jovens sobre a função e disfunção do assoalho pélvico é insuficiente.* ***Objetivo:*** *Identificar o nível de conhecimento de mulheres jovens sobre a anatomia e função dos músculos do assoalho pélvico (MAP), disfunção dos músculos do assoalho pélvico (DMAP), prolapso de órgãos pélvicos (POP) e disfunção sexual (DS).* ***Métodos:*** *Trata-se de um estudo transversal. Participaram dos estudo 242 mulheres jovens do primeiro ao terceiro ano do ensino médio de dez escolas públicas, em áreas geograficamente díspares de um município brasileiro que atende a populações de estudantes de minorias econômicas. A análise dos dados foi realizada usando SPSS 20.0 (SPSS Inc., Chicago, IL). Os dados categóricos foram expressos em frequência absoluta e relativa.* ***Resultados:*** *Apenas 28% das mulheres jovens conheciam os MAP e 26% responderam ser capazes de contrair esses músculos. A prevalência de incontinência urinária foi de 16%, enquanto 5% relataram incontinência fecal. O conhecimento prévio sobre POP foi semelhante entre o prolapso de bexiga e útero, 34% e 40%, respectivamente. De todas as mulheres jovens avaliadas, 48% tinham conhecimento sobre DS. Setenta e sete (31,8%) declararam ter vivenciado relação sexual, sendo que 10% destas declararam dificuldade para permitir a penetração vaginal e 48% das que conseguiam ter penetração declararam sentir dor e desconforto.* ***Conclusão:*** *Mulheres jovens apresentam pouco conhecimento sobre a anatomia e função dos MAP, sobre as DMAP, POP e sobre as DS. Além disso, apresentam queixas relacionadas à prática sexual, como dificuldade durante a penetração vaginal e dor.*

Palavras-chave: *Adolescente. Educação em saúde. Distúrbios do assoalho pélvico. Prevenção primária. Saúde da mulher.*

Introduction

Decades after a health model based on secondary and tertiary health care, a movement towards a preventive approach has been on the rise in recent years.[1,2] The implementation of preventive measures is challenging when it comes to pelvic floor muscle dysfunction (PFMD), pelvic organ prolapse (POP), and sexual dysfunction (SD), since the literature shows that women do not have sufficient knowledge about the subject, do not know available treatment options, and are not able to identify factors that may predispose the onset of these disorders.[2,3] The lack of information about general PFMD by the population results in delayed demand for the health sector, and this occurs long after the onset of the first symptoms, when these dysfunction has evolved and, therefore, has other components that make it improvement difficult.[2-6]

This context implies social, physical, psychological, and economic disorders for women.[2,6,7] Politically, the study of preventive education strategies is justified not only by the importance of devising new strategies to restore the well-being of the individual, but also by the fact of the economic impact.[2,6,8] With the increase in life expectancy and the chronicity of general PFMD, the tendency is that the treatment is done later and in greater complexity, resulting in higher expenses.[2,6,7] Sung et al.[7] estimated that the costs have increased in recent decades; direct spending on PFMD annually is $412 million.

The university has a very important mission, which goes beyond its physical limits, which is to understand the reality of the community that is inserted and, in this way, to prevent the appearance of dysfunctions that can cause damage to society. Thus, the aim of this study was to identify the level of knowledge of young women about pelvic floor muscles (PFM) anatomy and function, PFMD, POP, and SD.

Methods

Ethical aspects

This is a cross-sectional study, approved by the research ethics committee (n. 1918/2009) of the School of Philosophy and Science of UNESP (Universidade Estadual Paulista/Campus Marília), Brazil.

Participants: inclusion criteria

All young women from the first to the third year of high school from ten public schools, in geographically disparate areas of a Brazilian county serving economic minority student populations, were invited to participate in the study. All participants over the age of 18 signed the consent form. Participants under the age of 18 years old presented the consent form signed by their respective legal guardians.

Procedures

The study was conducted from April/2016 to June/2018. Two hundred and forty-two young women were recruited. Two meetings were held at each participating school; the first one was intended to inform about the objectives of the study and to invite the young women to participate. The young women who agreed to participate received the consent form printed and were informed to bring it signed at the next meeting. In the second meeting, the young women answered the self-reported questionnaire pre-designed by the research team to assess the knowledge about PFM anatomy and function, PFMD, POP, and SD.

Statistical analysis

Data analysis was performed using SPSS 20.0 (SPSS Inc., Chicago, IL). The categorical data were expressed as absolute and relative frequency.

Results

Out of 643 young women that were invited, 220 refused to participate, 114 did not return consent forms and 67 did not attend the assessment day (Figure 1). Two hundred and forty-two young women, with an average age of 15.5 + 0.9 years old, participate in the study. Table 1 shows that only 28% of the young women knew PFM. The proportion of young women who did not want to answer the PFM function question was very high (72%). The same occurred on their perception of the ability to contract the PFM, only 26% answered to be able to do it. When questioned if they knew women with urinary incontinence, nearly half of them (51%) answered positively, and the prevalence of urinary incontinence in young women was 16%.

When asked if they knew women in their family with fecal incontinence, 9% answered yes, 21% knew women with fecal incontinence, and the prevalence of young women that reported fecal incontinence was 5%.

The previous knowledge about POP was similar between bladder and uterus prolapse, 34% and 40%, respectively. Around 60% considered unable to answer the question about if they knew someone with bladder and uterus prolapse. SD was known by 48% of the young women. When asked whether they knew people with vaginismus/dyspareunia, 10% chose yes and more than half did not answer the question. Seventy-seven young women (31.8%) declared to have had sexual intercourse. Ten percent declared difficulties to allow vaginal penetration, and 48% of those who were able to have penetration declared that they experienced pain and discomfort during sex.

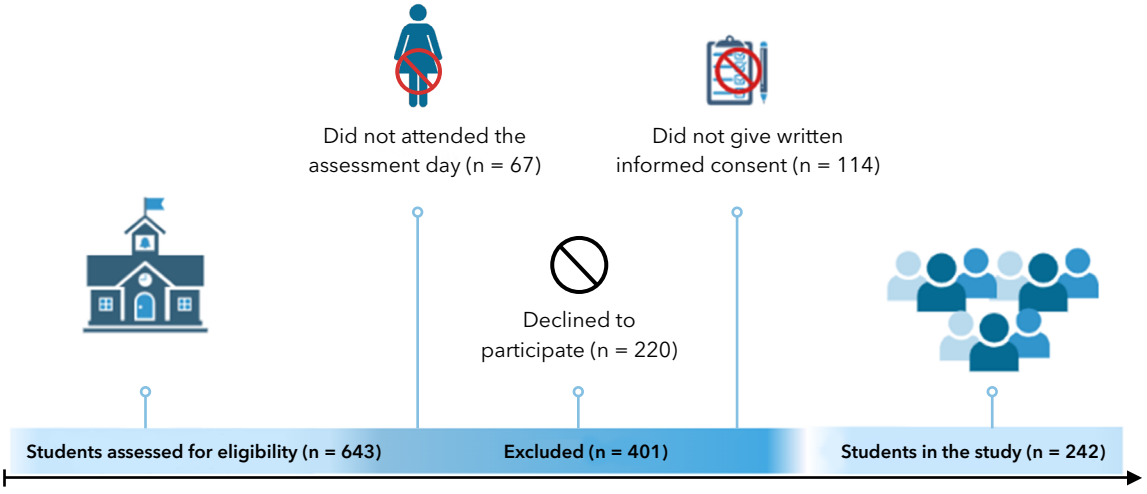

Figure 1 - Study flowchart.

Table 1 - Young women's conceptual knowledge of pelvic floor muscle anatomy and function, pelvic floor muscle dysfunction, pelvic organ prolapse, and sexual dysfunction (n = 242)

Questions	Yes (%)	No (%)	n/a (%)
Do you know about pelvic floor muscles?	28	72	-
Do you know the pelvic floor muscles function?	26	2	72
Are you able to perform pelvic floor muscles contractions?	26	1	73
Do you know about women that leak urine when cough, jump, laugh or after a sudden and strong need to urinate?	51	49	-
Do you know if any women in your family leak urine unintentionally?	22	29	49
Do you leak urine unintentionally?	16	73	11
Do you know about women that leak stool when cough, jump, laugh or after a sudden and strong need to evacuate?	21	79	-
Do you know if any women in your family leak stool unintentionally?	9	12	79
Do you leak stool unintentionally?	5	61	34
Do you know about women who present a dropped bladder?	34	66	-
Do you know if your relatives present a dropped bladder?	15	19	66
Do you know about women who present dropped uterus?	40	56	4
Do you know if your relatives present dropped uterus?	15	25	60
Do you know about women who experience pain or are not able to have sexual intercourse?	48	52	-
Do you know if your relatives had ever reported those sexual difficulties?	10	38	52
Are you able to allow penetration?*	90	10	-
Have you ever experienced pain or discomfort during sexual intercourse?**	48	52	-

Note: n/a = not answered. *This domain was performed in young women who had sexual intercourse (n = 77). ** This domain was performed in young women who had sexual intercourse and were able to have penetration (n = 69).

Discussion

From our findings emerged information about the knowledge of PFM anatomy and function, PFMD, POP, and SD of the young women. Furthermore, our findings showed an overview of the prevalence of PFMD and SD among them. Choosing schools to speak on health-related issues is an interesting strategy to detect early health issues.[2,9] The implementation and discussion in this environment could encourage young women to share new information with their colleges and could be a way to spread information to the community.[2,9]

Additionally, in the beginning, it was possible to observe that urinary incontinence (51%) and SD (48%) were the domains that young women were more acquainted compared to uterus prolapse (40%), bladder prolapse (34%) or fecal incontinence (21%). Similar questions were asked to adolescents by Arbuckle et al.,[10] however they did not divide PFMD into urinary incontinence and fecal incontinence; therefore, their study showed a higher percentage (62.9%) of adolescents who declared previous knowledge about both PFMD. On the other hand, comprehension of POP was more limited in their study (19.5%).[10] The self-reported prevalence of urinary and fecal incontinence[10] showed similarity to our study, including the proportion of relatives' complaints. Nevertheless, in the domains POP and "family member with fecal incontinence", the prevalence was higher in our study.

A recent systematic review warned that only a few women know sufficient information about PF health.[4] Our study shows little understanding of PFMD and POP symptoms. Besides, less than 30% of the young women have a background in PFM anatomy or function, which makes it hard to prevent or identify problems and search for assistance earlier.

A study by Mandimika et al.[11] showed similarities with our findings in older women. Earlier identifying this gap could avoid situations in which adult women address urinary incontinence as a natural process of aging that takes part in life and just naturalizes the process.[11]

Another important finding in this study was that 77 young women (31.8%) declared to have had sexual intercourse; this prevalence is higher than an Irish study that showed that 21.2% of young women of similar age were sexually initiated.[12] Early sexual initiation has been associated with physical and psychological risks.[13] In our study, we also asked young women who had initiated sexual intercourse about sexual issues, and alarming data showed that 10% experienced difficulty during penetration and 43% experienced pain/discomfort during sexual intercourse.

Superstition on the subject of sexuality, misinformation, and difficulty in accessing quality information only increase fear and feed beliefs that will culminate in future problems.[2,6,14] Further studies are needed to explore how to better educate and improve women's awareness of these prevalent PF disorders. The main strength of this research was that it was conducted in schools, and showed that young women have little knowledge about the subject addressed, although many are already sexually active, demonstrating that there is a need to teach these young women to avoid future problems.

Learning about PF health in an open and safe place provides discussion with high-quality information, which can be shared with others in the community. A limitation of this research was that it did not present information about the demographic characteristics of the young women, which could be important to assess the social context. Future research could implement physical evaluation in young women, giving support to better understand the results, and could perhaps involve workshops to guide young women about the PF disorders.

Conclusion

Young women have little knowledge about the PFM anatomy and function, PFMD, POP, and SD. In addition, they have complaints related to sexual practice, such as difficulty during vaginal penetration and pain or discomfort.

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Authors' contributions

All authors were equally responsible for the conception design, analysis, interpretation of data, writing of the manuscript, revision and approval of the final version.

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Prenatal and perinatal care in Governador Valadares, Minas Gerais state, Brazil

Assistência pré-natal e perinatal em Governador Valadares, Minas Gerais, Brasil

Érica Cesário Defilipo [1*]
Paula Silva de Carvalho Chagas [2]
Rívia Miranda da Silva [1]
Quézia Beatriz de Souza Costa [1]
Mariana Cristina Oliveira Guilherme [1]
Mariana Cristina Palermo Ferreira [1]
Luiz Cláudio Ribeiro [2]

[1] Universidade Federal de Juiz de Fora (UFJF), Governador Valadares, MG, Brazil
[2] Universidade Federal de Juiz de Fora (UFJF), Juiz de Fora, MG, Brazil

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*** Correspondence:** erica.defilipo@ufjf.edu.br

Abstract

Introduction: Prenatal care and the procedures adopted during childbirth are essential to ensure a healthy pregnancy and delivery and prevent complications, without affecting the health of the mother and newborn. **Objective:** To analyze the prenatal and perinatal care provided in Governador Valadares, Minas Gerais state, Brazil, and to determine whether there is an association between adequate prenatal care and socioeconomic, demographic, behavioral and reproductive factors. **Methods:** Cross-sectional study with a pre-existing database. The adequacy of prenatal care was analyzed based on three criteria: 1) onset up to the 16th week and a minimum number of checkups according to gestational age; 2) professional practices during prenatal checkups; 3) counseling given to the pregnant women by healthcare professionals. Multivariate logistic regression was used for data analysis. **Results:** Participants were 437 postpartum women. Prenatal care was considered adequate for 72.5, 93.1 and 50.1% of the participants based on criteria 1, 2 and 3, respectively. The pregnant women who were most likely to receive inadequate prenatal care in relation to criterion 1 were those with the lowest schooling level (OR = 1.68; p = 0.046), who were single (OR = 2.18; p = 0.002), did not work during their pregnancy (OR = 2.18; p = 0.003) and whose pregnancy was unplanned (OR = 1.76; p = 0.023). With respect to perinatal care, the presence of a birth companion and skin-to-skin contact were adequate, but breastfeeding in the first hour of life was not. **Conclusion:** There is a need to improve the counseling provided by healthcare professionals and include breastfeeding in the first hour of life. The results could contribute to optimizing maternal and child health services in Governador Valadares.

Keywords: Childbirth. Humanizing childbirth. Perinatal care. Pregnancy. Prenatal Care.

Resumo

Introdução: *O acompanhamento pré-natal e as condutas adotadas durante o parto são essenciais para garantir o bom desenvolvimento da gestação, prevenir complicações e proporcionar um parto saudável, sem impacto na saúde da puérpera e do recém-nascido.* ***Objetivo:*** *Analisar a assistência pré-natal e perinatal oferecida em Governador Valadares, Minas Gerais, e verificar se há associação entre a adequação do pré-natal e os fatores socioeconômicos, demográficos, comportamentais e reprodutivos.* ***Métodos:*** *Estudo transversal com base de dados pré-existente. Para a análise da adequação do pré-natal foram utilizados três critérios: 1) início até 16ª semana e número mínimo de consultas de acordo com a idade gestacional; 2) práticas dos profissionais nas consultas de pré-natal; 3) orientações oferecidas às gestantes pelos profissionais. Para a análise dos dados foi utilizada regressão logística multivariada.* ***Resultados:*** *Participaram do estudo 437 puérperas. A assistência pré-natal foi considerada adequada para 72,5%, 93,1% e 50,1% das puérperas, considerando os critérios 1, 2 e 3, respectivamente. As gestantes que apresentaram maior chance de terem o pré-natal inadequado, com relação ao critério 1, foram as com menor escolaridade (RC = 1,68; p = 0,046), que não possuíam companheiro (RC = 2,18; p = 0,002), que não trabalharam durante a gestação (RC = 2,18; p = 0,003) e as que não planejaram a gravidez (RC = 1,76; p = 0,023). Com relação à assistência perinatal, a presença de acompanhante e contato pele a pele foram apropriados, mas a amamentação na primeira hora de vida foi inadequada.* ***Conclusão:*** *Observou-se a necessidade de aprimorar as orientações fornecidas pelos profissionais e incluir a amamentação na primeira hora de vida. Os resultados podem contribuir para otimizar os serviços de saúde materno-infantil em Governador Valadares.*

Palavras-chave: *Parto. Parto humanizado. Cuidado pré-natal. Gravidez. Assistência perinatal.*

Introduction

Controlling maternal and perinatal mortality depends on monitoring by health services, especially in prenatal and postpartum care.[1] Prenatal care and procedures adopted during labor are essential in preventing perinatal complications.[2]

Prenatal care is defined as a set of preventive and health promotion services aimed at ensuring a healthy pregnancy for both the mother and baby.[3] The Brazilian Ministry of Health (MS in Portuguese) recommends at least six prenatal checkups, one in the first trimester, two in the second and three in the third.[4] The risk of mortality in newborns whose mothers had no prenatal care or only three checkups was four times greater than those whose mothers had six appointments. Additionally, when care is not provided at the appropriate times during pregnancy preterm birth may occur.[5,6]

Adequate perinatal care requires that the mother be treated within the health system. In order to improve maternal and child health care, the MS created the so-called Stork Network (*Rede Cegonha* in Portuguese)[7] to reduce mortality in this population, safeguard the health and quality of life of women during pregnancy, childbirth and postpartum, and to ensure better child development.[7,8]

The MS advocates for the humanization of both prenatal care and childbirth based on the following strategies: using evidence-based practices; organizing the healthcare network; classifying the risk of pregnant women and newborns; creating a bond between expectant mothers and maternity services; early identification of possible gestational risks; developing educational initiatives to prevent unnecessary interventions; facilitating access to quality health services from basic outpatient care to specialist hospital treatment; and providing quality humanized perinatal care, including the right to have a birth companion present.[2,4,8]

National research highlights shortfalls in prenatal care, including difficult access, late onset of care, insufficient prenatal checkups and noncompletion of recommended procedures, negatively affecting the quality and effectiveness of this care.[2,9,10] In addition to quantitative analysis of the aspects included in prenatal care, it is important to identify the factors associated with poor quality care.[2] Pregnant women treated in public health services who had low schooling levels and household income, were single, smoked, consumed alcohol or used drugs during their pregnancy showed higher percentages of inadequate prenatal care.[11,12]

In light of the above, and because this topic is little investigated in Governador Valadares, considered a healthcare hub in the Vale do Rio Doce microregion of Minas Gerais state, there is a need to assess the

prenatal and perinatal care provided in the city. This study aimed to analyze the prenatal and perinatal care of mothers who gave birth at the Governador Valadares Municipal Hospital and determine whether there is an association between adequate care and socioeconomic, demographic, behavioral and reproductive factors.

Methods

This is a cross-sectional study that used a pre-existing database from a doctoral thesis entitled *Fatores associados à prematuridade e ao baixo peso ao nascer em Governador Valadares, Minas Gerais: estudo caso-controle* (Factors associated with prematurity and low birth weight in Governador Valadares, Minas Gerais: a case-control study),[13] approved by the Research Ethics Committee of Universidade Federal de Juiz de Fora in November 2016 (CAAE: 61055716.4.0000.5174).

The sample in the original study[13] was consecutive and consisted of 771 infants born at the Governador Valadares Municipal Hospital between May 2017 and July 2018, whose mothers resided in Governador Valadares or neighboring municipalities. The hospital is considered a reference center for municipalities in the Vale do Rio Doce region because it treats patients under the National Health System (Sistema Único de Saúde in Portuguese) and is the only facility in the region with a Neonatal Intensive Care Unit. The present study included only postpartum women who participated in the aforementioned research[13] and received prenatal care in Governador Valadares, and excluded those treated in other municipalities, resulting in a sample of 437 individuals.

In regard to data collection in the original study,[13] aan active daily search was conducted at the maternity wing of the Governador Valadares Municipal Hospital and data from the previous day's births were analyzed, consisting of information on the gestational age, birth weight, sex and date of birth of the newborns. The women were approached 24 to 48 hours after childbirth, while still hospitalized, and the procedures and objectives of the study explained. Those who agreed to participate provided written informed consent. Participants were subsequently submitted to a semi-structured interview and complementary information was obtained by analyzing the prenatal checkup records and medical charts of the women and newborns.

Three criteria were used to assess the adequacy of prenatal care. The first criterion covered the onset of prenatal care and number of checkups. Beginning prenatal care by the 16th week of gestation was considered adequate. The adequacy of the number of checkups was analyzed based on the calendar recommended by the MS,[4] which stipulates a minimum of six prenatal checkups over a gestational period of 37 weeks or more. Since the gestational age at birth varied among participants, assessment was also based on the model developed by Domingues et al.,[10] thereby mitigating the possibility of reverse causality between the variables "number of checkups" and "preterm birth". This adjustment was important because the prenatal care of mothers with a preterm birth could have been deemed inadequate because they were unable to achieve the recommended minimum number of checkups. As such, for the present study prenatal care was considered adequate when the mother had at least one prenatal checkup by the 16th week of pregnancy; two by 17 to 21 weeks; three by 22 to 27 weeks; four by 28 to 33 weeks; five by 34 to 37 weeks; and a total of six visits after 37 weeks.[4,10]

The second criterion, based on a study by Coutinho et al.,[9] evaluated the following professional practices during prenatal checkups: 1) taking the patient's blood pressure; 2) weighing the patient; 3) measuring the fundal height; and 4) assessing the fetal heart rate. This information was obtained from participants via direct questions. Care was deemed adequate when all four items had been checked during prenatal visits.

The third criterion covers counseling given to pregnant women by healthcare professionals during prenatal checkups, considering the following variables: signs of labor, breastfeeding and maternal vaccines.[2,10] Information on the signs of labor and breastfeeding were collected directly from participants and vaccines were checked in their medical records and vaccination cards. If the healthcare professional advised the participants on these three variables at least once, prenatal care was considered adequate. Perinatal care was assessed based on type of delivery, presence of a birth companion during labor, skin-to-skin contact between mother and baby and breastfeeding in the first hour of life.

The data were input into the Statistical Package for the Social Sciences (SPSS) 14.0 for statistical analysis. Descriptive analysis of the variables was carried out to characterize the participants, with the results presented in tables as absolute frequencies and percentages. The

analysis of prenatal care based on the three criteria was presented in graph format, with percentages for each group. The association between the variables studied and the three criteria for adequate prenatal care was assessed using the chi-squared test, and the significant variables were used in a multivariate logistic regression model, with significance set at $p < 0.05$.

Results

Participants were 437 postpartum women. The gestational history and characterization of the population studied based on socioeconomic, demographic and behavioral variables are presented in Table 1.

The variables related to the prenatal period, childbirth and postpartum are described in Table 2. With respect to the newborns, 110 were preterm (25.2%), 102 had low birth weight (23.3%) and the vast majority whose medical records or newborn health card contained a 5-minute APGAR score obtained values greater than or equal to 7 (92.9%). It is important to note that 26 newborns did not obtain this score and were therefore excluded from analysis. Among the postpartum participants, 158 (36.1%) used health services for emergencies during their pregnancy.

Based on the first criterion (number of checkups and early-onset care), 116 (26.5%) received inadequate care, while for the second criterion, (professional practices), only 15 (3.4%) reported they were not properly assessed, indicating inadequate care. For the final criterion (counseling given to expectant mothers), 203 (46.5%) indicated they were given no instructions on the signs of labor, breastfeeding or vaccination, which is considered inadequate care (Figure 1).

All the variables studied were analyzed considering the three criteria adopted, with only the first criterion exhibiting a significant association. The factors significantly associated with adequate prenatal care based on the number of checkups and onset of care (criterion 1) were: maternal schooling level ($p < 0.001$), maternal age ($p < 0.001$), marital status ($p < 0.001$), employment ($p < 0.001$), planned pregnancy ($p < 0.001$), previous miscarriage ($p = 0.026$), smoking ($p = 0.001$), drug use ($p = 0.017$) and prenatal care location ($p = 0.014$). Due to the large number of variables, only those with a statistically significant association ($p < 0.05$) are presented in Table 3.

Table 1 - Characterization of the population studied

Variables	n	%
Schooling Level		
Incomplete high school or less	199	45.5
Secondary diploma or higher	238	54.5
Age		
Adolescent (12 to 18 years)	58	13.3
Young adult (19 to 34 years)	324	74.1
Older adult (≥ 35 years)	55	12.6
Race		
White	62	14.2
Black or brown	375	85.8
Marital status		
In a relationship	337	77.1
Single	100	22.9
Employment during pregnancy		
Worked	178	40.7
Did not work	259	59.3
Number of children		
First child	224	51.3
Second child or more	213	48.7
Household income[a]		
< 2 monthly minimum wages	213	48.7
≥ 2 monthly minimum wages	202	46.2
Alcohol dependent		
No	408	93.4
Yes	29	6.6
Smoker		
No	403	92.2
Yes	34	7.8
Drug user		
No	430	98.4
Yes	7	1.6
Violence during pregnancy		
No	396	90.6
Yes	41	9.4
Previous miscarriage		
No	357	81.7
Yes	80	18.3
Previous PMT/LBW child[b]		
No	189	43.2
Yes	24	5.5

Note: PMT = premature; LBW = low birth weight. [a]Some participants were unable or unwilling to provide information on household income (n = 22) and these were considered missing data for the analysis. [b]224 participants were excluded from this analysis as primipara.

Table 2 - Variables related to the prenatal period, childbirth and postpartum

Variables	n	%
Planned pregnancy		
No	246	56.3
Yes	191	43.7
Number of prenatal checkups[a]		
< 6	120	27.5
≥ 6	313	71.6
First prenatal checkup[a,b]		
≤ 16 weeks	363	83.1
> 16 weeks	60	13.7
Weight assessed[c]		
No	6	1.4
Yes	416	95.2
Blood pressure taken[c]		
No	3	0.7
Yes	419	95.9
Fundal height measured[c]		
No	8	1.8
Yes	414	94.7
Fetal heart beat[c]		
No	6	1.4
Yes	416	95.2
Counseling on signs of labor[c]		
No	145	33.2
Yes	277	63.4
Vaccine counseling		
No	30	6.9
Yes	407	93.1
Breastfeeding counseling[c]		
No	159	36.4
Yes	263	60.2
Type of delivery		
Vaginal	266	60.9
Cesarean section	171	39.1
Birth companion		
No	186	42.6
Yes	251	57.4
Skin-to-skin contact		
No	109	24.9
Yes	328	75.1
Breastfeeding in the first hour of life		
No	246	56.3
Yes	191	43.7
Prenatal care location[b]		
Public	354	81.0
Private	73	16.7

Note: [a]Four postpartum participants could remember neither the date of their first prenatal checkup nor the number of checkups and this information was not in their records, precluding them from analysis for the variables "number of prenatal checkups" and "first prenatal checkup". [b]Ten postpartum participants had no prenatal care and were therefore excluded from analysis for the variables "first prenatal checkup" and "prenatal care location". [c]Fifteen postpartum participants were considered absent for analysis of these variables, ten for having no prenatal care and five for having only one prenatal checkup, thereby precluding assessment of professional practices.

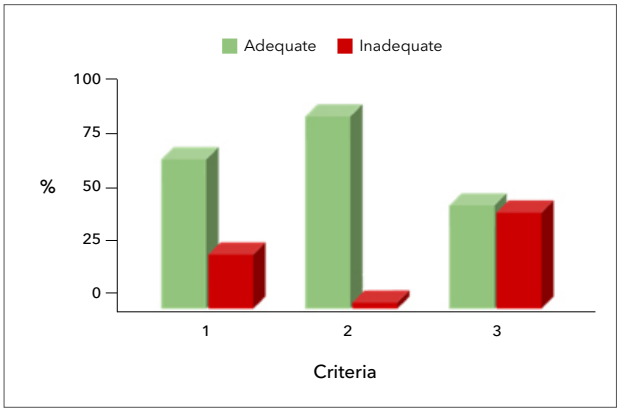

Figure 1 - Adequacy of prenatal care based on criteria 1, 2 and 3.

Note: *Postpartum participants without the necessary information or who had no prenatal care were excluded from these analyses, as described in the notes for Table 2. Criteria: 1 - Early onset care and number of checkups in line with gestational age; beginning prenatal care by the 16th week of gestation was considered adequate. 2 - Professional practices during prenatal checkups: taking the patient's blood pressure, weighing the patient, measuring the fundal height, and assessing the fetal heart rate. Care was deemed adequate when all four items had been checked during prenatal visits. 3 - Counseling given to pregnant women by healthcare professionals during prenatal checkups, considering the following variables: signs of labor, breastfeeding and maternal vaccines. If the healthcare professional advised the participants on these three variables at least once, prenatal care was considered adequate.

The significant variables in Table 3 were included in a multivariate logistic regression model and the following factors maintained a significant association with adequate prenatal care: maternal schooling level (OR = 1.68; p = 0.046), marital status (OR = 2.18; p = 0.002), employment (OR = 2.18; p = 0.003) and planned pregnancy (OR = 1.76; p = 0.023). The p-value for previous miscarriage was close to significance (p = 0.053) and therefore remained in the model for discussion (Table 4).

Table 3 - Association between the variables studied and adequacy of prenatal care based on the number of checkups and early-onset care (criterion 1)

Variables	Adequate prenatal		Inadequate prenatal		p-value
	n	%	n	%	
Maternal schooling level					
Incomplete high school or less	127	40.1	69	59.5	< 0.001
Secondary diploma or higher	190	59.9	47	40.5	
Maternal age					
≤ 18 years	30	9.5	27	23.3	< 0.001
>19 years	287	90.5	89	76.7	
Marital status					
In a relationship	261	82.3	72	62.1	< 0.001
Single	56	17.7	44	37.9	
Employment					
Unemployed	169	53.3	88	75.9	< 0.001
Employed	148	46.7	28	24.1	
Planned pregnancy					
No	161	50.8	82	70.7	< 0.001
Yes	156	49.2	34	29.3	
Previous miscarriage					
No	252	79.5	103	88.8	0.026
Yes	65	20.5	13	11.2	
Smoker					
No	300	94.6	99	85.3	0.001
Yes	17	5.4	17	14.7	
Drug user					
No	315	99.4	111	95.7	0.017
Yes	2	0.6	5	4.3	
Prenatal care location					
Public	254	80.1	96	90.6	0.014
Private	63	19.9	10	9.4	

Table 4 - Multivariate logistic regression results for factors associated with adequate prenatal care based on the number of checkups and early-onset care (criterion 1)

Variables	OR	95%CI	p-value
Maternal schooling level			
Incomplete high school or less	1.68	1.00 – 2.56	0.046*
Secondary school diploma or higher	Ref	-	
Marital status			
Single	2.18	1.32 – 3.60	0.002*
In a relationship	Ref	-	
Employment			
Unemployed	2.18	1.31 – 3.61	0.003*
Employed	Ref	-	
Planned pregnancy			
No	1.76	1.08 – 2.85	0.023*
Yes	Ref	-	
Previous miscarriage			
No	Ref	-	
Yes	0.51	2.64 – 1.00	0.053

Note: OR = odds ratio; CI = confidence interval; Ref = reference category; *p < 0.05.

Discussion

This study analyzed the prenatal and perinatal care provided in Governador Valadares and the association between adequate prenatal care and socioeconomic, demographic, behavioral and reproductive factors. Prenatal care was considered adequate for 72.5, 93.1 and 50.1% of the participants based on criteria 1, 2 and 3, respectively. In relation to the presence of a birth companion, it was deemed adequate for 57.4% of participants, 75.1% for skin-to-skin contact and only 43.7% for breastfeeding in the first hour of life.

In regard to the profile of the postpartum participants, most were brown or black, between 19 and 34 years old, primiparous, had a secondary school diploma or higher, resided with a romantic partner and had an income below two monthly minimum wages. Similar results were obtained by Mendes et al.[14] and Marques et al.[15] in studies conducted in the states of Sergipe and Santa Catarina, respectively.

Almost 40% of participants in the present study underwent a cesarean section, as observed by Queiroz et al.[16] in a rural area of Ceará state. The C-section rate

remains high, despite the ideal rate of approximately 15% recommended by the World Health Organization (WHO). It is important for expectant mothers to be properly prepared for childbirth and receive counseling and clarification on the advantages of a vaginal birth, since many view a cesarean as a means of escaping the suffering of physiological pain. This counseling is believed to be important in reducing C-section rates.[16]

A study on reproductive and maternal health over the 30 years of the National Health System (SUS)[17] found a C-section rate of 55% in 2015. Leal et al.[3] recorded a rate of 43.3% between 2011 and 2012, corroborating the findings of the present study. Of the live births in Governador Valadares in 2019, 59.6% were cesarean sections, a very high rate considering WHO recommendations. The growing rates of this surgical procedure in recent years should serve as a warning to healthcare professionals and managers because unnecessary cesareans increase the risk of maternal death.[17,18]

Analysis of prenatal care (criterion 1) indicated that more than 70% of participants received adequate care. Those whose care was classified as inadequate started prenatal checkups late and/or did not reach the recommended minimum number of visits for their gestational age. Establishing the ideal number of checkups is a valuable tool in planning healthcare services and care protocols for pregnant women, promoting health and preventing possible risks, since the assumption is that the larger the number of checkups, the greater the opportunity for prevention and the more counseling received.[10]

The result obtained here for criterion 1 was better than that reported by Coutinho et al.[9] for users of the SUS in Juiz de Fora (MG), with only 27.6% receiving adequate care. It is important to underscore that the present study used a different criterion to evaluate the adequacy of prenatal care. Additionally, the study by Coutinho et al.[9] was conducted before the Stork Network was implemented,[7,8] which may explain the different results. Another study that evaluated pregnant women treated at SUS health units in the city of Rio de Janeiro between 2007 and 2008, used only the Program for Humanization of Prenatal Care and Childbirth (PHPN) criterion and obtained worse results than those found here (38.5%).[10]

Leal et al.[3] assessed the prenatal care of 19,117 women in the Brazilian public health network and found that 69% had sufficient prenatal checkups and received care early, with the most adequate provided in the Southeast (77.3%). Thus, the high number of women who received inadequate care (n = 116) in the present study should serve as a warning for municipal health services to create new strategies aimed at better coverage and building bonds with expectant mothers, since the result obtained for care adequacy in the municipality studied was worse than that recorded for the state as a whole. It should be noted that in some cases, starting prenatal care late affected the number of checkups, making it impossible for the women to reach the recommended minimum number, which contributed to inadequate care. Other national studies also demonstrated the negative effect of starting checkups late on the adequacy of the prenatal care provided.[10,19]

According to the second criterion, more than 90% of participants in the present study received adequate prenatal care, indicating that they were properly assessed for blood pressure, weight, fundal height and fetal heartbeat. It is important to underscore that other assessment items and tests were not considered because these data were not collected. It should also be noted that information in the present study was collected via direct questions in questionnaires applied to the participants, and that some of the women may not have known what types of tests and assessments had been done. Another study that evaluated technical procedures and tests performed during prenatal visits showed that most women had their blood pressure and weight checked, fundal height measured and were fully vaccinated, which corroborates our findings and makes it possible to infer that these practices are part of the everyday routine of healthcare professionals.[20]

By contrast, in relation to criterion 3, prenatal care was considered inadequate for almost half of the participants. To assess the quality of the counseling provided to pregnant women, two aspects must be considered: ability to interpret the information and the bond between the healthcare professional and the patient. While on the one hand professionals are seen as knowledgeable, they are also unfamiliar to the patient and directly involved in her pregnancy and her life at the time. In conjunction with this are her family and community, who are also part of her history and have empirical knowledge about pregnancy.

The challenge in ensuring that counseling is in fact understood seems to be a combination of the

lack of connection between patient and doctor and how the latter conveys the information, added to the abundance of inaccurate information passed on by friends and family members.[21] In order to overcome this challenge, healthcare professionals must provide humanized care, understand that health education should consider the individual needs of each patient and provide more assertive care. The results of the present study corroborate those of another cross-sectional quantitative investigation with 3,111 postpartum SUS users from Santa Catarina state who received prenatal care in 2019. The researchers applied a questionnaire up to 48 hours postpartum, within the hospital setting, and analyzed the adequacy of counseling received during prenatal checkups. The prevalence of instructions about breastfeeding was 45.9% and the adequacy of counseling provided was rated at only 18.4%.[15]

In regard to humanization practices during and immediately after childbirth, the results demonstrated that more than half of the postpartum women had a companion present during labor and most had skin-to-skin contact with their baby immediately after birth. However, more than half did not breastfeed their baby in the first hour of life. This last result corroborates the findings of another study,[2] which indicates that 64% of mothers did not breastfeed in the first hour of life.

The pregnant women who were most likely to receive inadequate prenatal care in relation to criterion 1 were those with the lowest schooling level (OR = 1.68; p = 0.046), who were single (OR = 2.18; p = 0.002), did not work during their pregnancy (OR = 2.18; p = 0.003) and whose pregnancy was unplanned (OR = 1.76; p = 0.023). Research by Pedraza[22] and Viellas et al.[2] corroborates our findings, suggesting that starting prenatal care early is associated with maternal schooling level. Another Brazilian study[19] also observed an inverse association between the mother's schooling and inadequate prenatal care. According to Ramos and Cuman,[23] poor schooling is linked to low socioeconomic status, which may predispose mother and baby to potential risks by preventing access to professional counseling and information. It is important to underscore that the results obtained here for schooling level should be interpreted with caution, since 13.3% of participants were adolescents (12 to 18 years) and may not have finished high school.

Marital status was also a significant variable, indicating that pregnant women with a romantic partner received better prenatal care. The study by Viellas et al.[2] reinforces the results obtained by demonstrating a significant difference when comparing single pregnant women to those with a partner. Personal problems were also more common among single participants and were one of the reasons the authors[2] used to justify failure to attend prenatal checkups and late-onset care. As such, having a romantic partner seems to function as a support system, ensuring favorable results in monitoring the pregnancy and making it important for healthcare professionals providing prenatal care to be mindful of the marital status of expectant mothers who use healthcare services.

Paid work during pregnancy was also significantly associated with adequate prenatal care. This corroborates the findings of Côrrea et al.,[24] who demonstrated that unemployed pregnant woman began prenatal care late and as such, 73.9% received inadequate care.

Women who planned their pregnancy started prenatal checkups early and therefore exhibited a higher level of adequate care. In a national hospital-based study, 44.6% of expectant mothers planned their pregnancy and 84.7% of these began attending prenatal checkups early, with 63.7% starting by the 16th week when compared to those whose pregnancy was unplanned.[2]

In the present study, previous miscarriage was considered a protective factor for inadequate prenatal care. This result was close to being significant and therefore should be discussed in future research to ensure healthcare professionals pay greater attention to this factor. Pregnant women who had experienced a miscarriage were more concerned about their pregnancy and therefore took better care of themselves to prevent this from recurring. Thus, they tend to start prenatal care early and reach the minimum number (or more) of checkups recommended for their gestational age. In order to conduct a more detailed assessment of this topic, bibliographic searches were conducted using the keywords "miscarriage, prenatal adequacy, spontaneous abortion" (in Portuguese and English); however, no studies were found that discussed the relationship between adequate prenatal care and a previous miscarriage.

It is also important to discuss the factors that did not remain in the final logistic regression model: maternal age, drug use, smoking and prenatal care location. Among the pregnant adolescents, 47% of them received

inadequate care. Adolescents are more likely to have fewer than four prenatal checkups because of lack of information or fear of their family's reaction to news of the pregnancy, thereby compromising perinatal outcomes.[25] Expectant mothers who use drugs show poor adherence to prenatal care due to their fear of losing custody of their child.[26,27] Nonsmokers and those who abstain from smoking while pregnant have more prenatal checkups than expectant mothers who smoke ($p = 0.025$).[28] According to Domingues et al.,[29] the prenatal care provided by public health services was around 10% less adequate when compared to private health care. Another study demonstrated that only two of every three pregnant women treated in the public sector had six or more prenatal checkups and began prenatal care in the first trimester, whereas nine of every ten women treated in the private sector received adequate prenatal care.[30]

A limitation of the present study was the recall bias of postpartum participants and missing or incomplete data in their medical or prenatal records. In addition, being a local study with a sample from a single facility precludes generalizing the results.

Conclusion

Prenatal care in Governador Valadares was considered adequate for most participants in terms of when care began, the number of checkups, and assessment of the pregnant women. However, analysis of the counseling provided by healthcare professionals showed that care was inadequate for almost half the study population. Perinatal care was found to be adequate regarding the presence of a birth companion and skin-to-skin contact, but inadequate for breastfeeding in the first hour of life.

The pregnant women most likely to receive inadequate prenatal care in relation to the number of checkups and the onset of care were those with the lowest schooling level, who were single, did not work during their pregnancy and whose pregnancy was unplanned. There is a therefore a need to improve the care provided in Governador Valadares.

This study could contribute to optimizing the prenatal and perinatal services offered to expectant mothers in the municipality and to early identification of the factors associated with inadequate prenatal care.

Authors' contributions

All the authors participated in the study design, data analysis and interpretation, writing the manuscript and approving the final version.

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Effects of myofascial reorganization associated with kinesiotherapy on chronic pain and functionality of breast cancer survivors: development of a study protocol

Efeitos da reorganização miofascial associada à cinesioterapia na dor crônica e funcionalidade de sobreviventes de câncer de mama: desenvolvimento de um protocolo de estudo

Natália de Souza Cunha [1*]
Larissa Sinhorim [2]
Robert Schleip [3]
Kamilla Zomkowski [2]
Gilmar Moraes Santos [1]
Fabiana Flores Sperandio [1]

[1] Universidade do Estado de Santa Catarina (UDESC), Florianópolis, SC, Brazil
[2] Universidade do Sul de Santa Catarina (UNISUL), Palhoça, SC, Brazil
[3] Ulm University, Guenzburg, Germany

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*** Correspondence:** ndscunha@gmail.com

Abstract

Introduction: Breast cancer is the most common type of cancer among women. Treatments can lead to complications modifying upper limbs movement patterns and generating pain and functionality loss. Kinesiotherapy and myofascial reorganization (MR) have shown positive effects reducing chronic pain and improving upper limbs function. We hypothesize that these techniques can maximize results and reduce treatment time in clinical practice. **Objective:** To develop a study protocol to verify whether MR associated with kinesiotherapy is more effective than isolated kinesiotherapy to treat chronic pain and upper limb dysfunction in breast cancer survivors. **Methods:** Participants will be divided into two groups: intervention group (myofascial reorganization + kinesiotherapy) and sham group (traditional massage + kinesiotherapy). Six treatment sessions (once a week) and three-time assessment will occur. Instruments for assessing pain and functionality will be Visual Analogue Scale, Body Pain Diagram, Disabilities of the Arm, Shoulder and Hand Questionnaire, and goniometry. Statistical analysis will be conducted based on intention-to-treat analysis. To analyze the difference of means between groups, we will use T-Student or U Mann-Whitney test. Repeated measures ANOVA will be used to check treatments effects. Significance level for all tests will be 5%. **Conclusion:** We believe that the developed study protocol will show that MR associated with kinesiotherapy improve chronic pain and upper limbs functionality of breast cancer survivors.

Keywords: Breast cancer. Chronic pain. Functionality. Manual therapy. Physiotherapy modalities.

Resumo

Introdução: *O câncer de mama é o tipo de câncer mais comum entre as mulheres. Os tratamentos podem levar a complicações, modificando os padrões de movimento dos membros superiores e gerando dor e perda de funcionalidade. A cinesioterapia e a reorganização miofascial (RM) têm demonstrado efeitos positivos na redução da dor crônica e na melhora da função dos membros superiores. A hipótese do presente estudo é que essas técnicas podem maximizar os resultados e reduzir o tempo de tratamento na prática clínica.* ***Objetivo:*** *Desenvolver um protocolo para verificar se a RM associada à cinesioterapia é mais eficaz do que a cinesioterapia isolada no tratamento da dor crônica e disfunção do membro superior em sobreviventes de câncer de mama.* ***Métodos:*** *As participantes serão divididas em dois grupos: grupo intervenção (reorganização miofascial + cinesioterapia) e grupo* sham *(massagem tradicional + cinesioterapia). Serão realizadas seis sessões de tratamento (uma vez por semana) e três avaliações. Os instrumentos de avaliação da dor e da funcionalidade serão a Escala Visual Analógica, o Diagrama de Dor Corporal, o Questionário de Deficiências do Braço, Ombro e Mão e a goniometria. A análise estatística será realizada com base na análise de intenção de tratar. Para analisar a diferença de médias entre os grupos, serão utilizados o teste T-Student ou U Mann-Whitney. ANOVA de medidas repetidas será utilizada para verificar os efeitos dos tratamentos. O nível de significância para todos os testes será de 5%.* ***Conclusão:*** *Espera-se que a RM associada à cinesioterapia melhore a dor crônica e a funcionalidade dos membros superiores de sobreviventes de câncer de mama.*

Palavras-chave: *Câncer de mama. Dor crônica. Funcionalidade. Terapia manual. Modalidades de fisioterapia.*

Introduction

According to the World Health Organization (WHO), breast cancer is the most commonly diagnosed cancer.[1] Breast cancer treatments can lead to several complications: scar adhesions, tissue fibrosis, reduced range of motion (ROM), reduced upper limb muscle strength, and pain.[2] These factors, alone or in combination, change the upper limbs movement patterns and might lead to chronic pain and reduced functionality, affecting these women quality of life and daily living activities.[2-4]

Chronic pain after breast cancer surgery is one of the most common complaints, with a prevalence ranging from 20% to 68%.[5-7] Different mechanisms might be involved (nociceptive, neuropathic, central sensitization, and/or allodynia) and can make chronic pain treatment a challenge in clinical practice.[8] Due to chronic pain mechanisms complexity and multifactorial nature, there is no consensus in literature about the best therapeutic modality to treat this condition in women after breast cancer,[9] which intrigues researchers and clinicians.

Another common complication after breast cancer surgery is the reduced upper limb function, with a prevalence rate of over 50%.[2,10,11] Some factors are associated with worsening of upper limb function, such as pain intensity and characteristics, reduced shoulder flexion and abduction ROM, and decreased upper limb muscle strength.[11]

Literature suggests chronic pain treatment should be based on multidisciplinary approach involving pain education, psychopharmacological and physical therapy interventions.[12] Techniques like kinesiotherapy, stretching, strengthening, and neuromuscular control exercises can increase mobility and reduce shoulder pain.[9] Also, kinesiotherapy has shown positive effects for reducing chronic pain and increasing upper limbs functionality.[9,12] On the other hand, more than one intervention can be effective for the same symptom and these effects depend not only on the intervention type, but also on how and when it is applied.[9] The type, frequency, intensity, and ideal exercises duration are still not clear enough, as well as their effects in combination with other modalities in the treatment of the same symptoms.[9,13] Thus, two techniques association might lead to greater benefits.

Myofascial reorganization (MR) is a method of myofascial manual therapy which emphasizes: (i) diagonal pressure; (ii) shear loading; (iii) tensile loading; (iiii) compressive loading in the myofascial tissue. It aims to influence receptors in the fascia, contributing to changes in local fluid dynamics, capillary constriction and increased local blood flow, restoring normal integrity of treated tissue.[14] Thus, MR may reduce pain and improve body structures mobility and function.[15-17] In addition, manual contact is safe and reduces costs,[18] given the wide clinical applicability. Although current evidence indicates the effectiveness of interventions in fascial system, there are scarce high-quality methodological articles with large sample sizes,

requiring new studies to understand the role of available techniques.[19]

As there is insufficient information and no consensus on optimal chronic pain management and upper limb functionality among breast cancer survivors, we hypothesize that by combining benefits of two therapies we can maximize results and reduce treatment time in clinical practice. Therefore, this study aims to develop a study protocol to verify whether MR associated with kinesiotherapy is superior to isolated kinesiotherapy in chronic pain treatment and upper limb dysfunction in breast cancer survivors.

Methods

This study was approved by the Ethics Committee on Research with Human Beings (CEPSH) of the Universidade do Estado de Santa Catarina (UDESC), under CAAE protocol 10420519.7.0000.0118, and has been registered on the Clinical Trials platform under the protocol NCT04084600.

Study design

The study described in this protocol will be a double blind randomized controlled clinical trial (assessor and patient), parallel in two groups (IG - intervention group; and SG - sham group), organized according to the flowchart below (Figure 1). The protocol was developed according to the SPIRIT (Standard Protocol Items: Recommendations for International Trials) checklist, 2013.

All participants who agree to be part of the study will make the initial evaluation after signing the Informed Consent Form.

Setting and recruitment procedures

Data collection will be carried out in a reserved room at the Physiotherapy School Clinic of UDESC, in Florianópolis, Brazil. Women will be recruited by our research group through folders, banners, social media, and in person at the College of Health and Sport Science (CEFID) of UDESC.

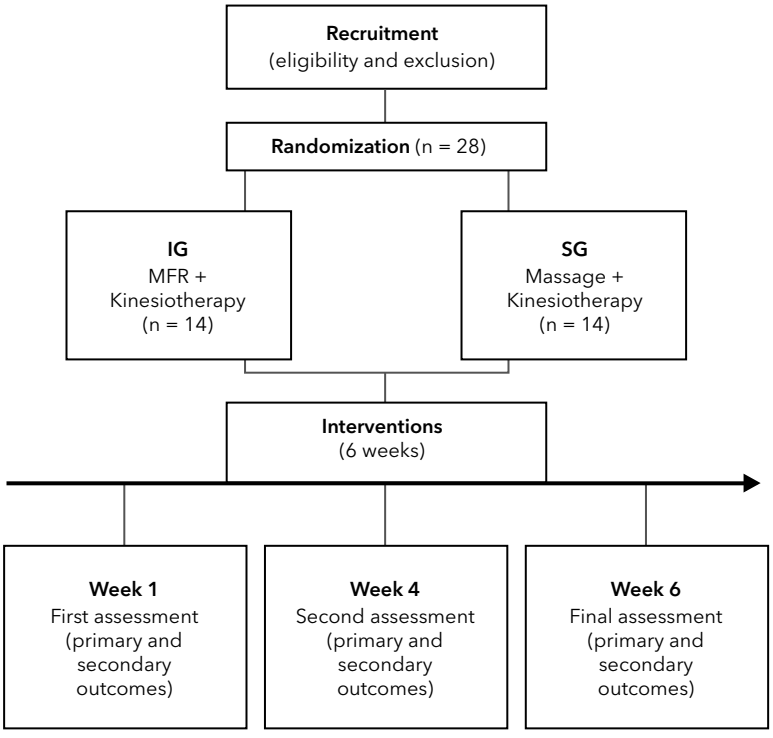

Figure 1 - Study flowchart.

Note: IG = intervention group; SG = sham group; MFR = myofascial reorganization.

Randomisation and blinding procedures

Participants will be randomly assigned to the IG or SG groups. Randomization will be carried out when recruitment procedures were finished through a random numerical sequence generated on Randomizer.org, in blocks, with an allocation rate of 1:1. Participants allocation will be hidden in sequentially sealed, numbered opaque envelopes prepared before the study starts. A researcher, who will not be involved in the other trial stages, will be responsible for randomization and allocation procedures. There will be three researchers responsible for assessments and they will not have access to participants allocation. The physiotherapist responsible for the interventions will not participate in assessments or participants allocation.

Participants

The sample will be composed of women who meet the following inclusion criteria: (1) age over 18 years; (2) have undergone breast cancer surgery; (3) have completed chemotherapy and/or radiotherapy; (4) present pain in the affected upper quadrant of the surgery for at least three months, with a minimum score of four-cm on the visual analogue scale (VAS) in the last week; (5) present a score of at least 30 in the DASH questionnaire (Disabilities of the arm, shoulder and hand).

Participants who present one of the following criteria will be excluded: (1) difficulty in understanding the Portuguese language to answer the questionnaires; (2) bilateral surgery for the treatment of breast cancer; (3) palliative care; (4) pregnant women; (5) use of analgesic and/or anti-inflammatory drugs; (6) rheumatic diseases; (7) history of orthopaedic surgery in the upper limbs; (8) have undergone physiotherapy treatment for less than 30 days.

Initial assessments

Women who agree to join the study will sign a Free Informed Consent Form and will be notified of the possibility to withdraw from the research at any stage. All participants personal identification data will be preserved according to national health council resolution, considering the possibility of results scientific dissemination. None of the participants will receive financial support to participate in the research.

Assessments will be conducted by three different physiotherapists, blinded and properly trained. Initially, in a face-to-face interview, a sociodemographic and clinical-surgical form will be fulfilled. Sociodemographic items include: name, age, education, marital status, ethnicity, living habits, physical activity, limb dominance, gynaecological history, gestational history and family income. For clinical-surgical aspects, type of breast cancer, cancer side, type of surgery, date of diagnosis, lymph node resection, other previous treatments and complications reported will be assessed.

Outcomes

Assessments will take place in three stages: just before the first treatment session (week 1), immediately after four treatment sessions (week 4), and at the end of the last treatment session (week 6). The primary outcome will be pain intensity and frequency measured by the VAS and the Body Pain Diagram (BPD). The secondary outcome will be upper limbs functionality by DASH and ROM, identified by the mean of the goniometry values.

VAS is a valid and reliable scale, widely used to identify pain intensity.[20,21] It consists of a numbered line from 0 to 10, 0 being no pain and 10 being the worst pain imaginable. BPD is a graphic representation of a woman's body in anterior, posterior and lateral view, created by Zomkowski et al.,[22] in order to identify the site and frequency of pain. In this diagram, women should mark their principal pain areas at the moment with an X. For the frequency analysis of pain location, the BPD will be segmented into five areas: anterior trunk, posterior trunk, lateral trunk, affected upper limb, and unaffected upper limb.

DASH will be used to assess the disabilities and physical symptoms of the upper limbs. It was created in Canada in 1996[23] and translated and validated in Brazil in 2005.[24] It is a 30-item questionnaire that assesses physical disabilities and upper limbs symptoms in a wide variety of musculoskeletal disorders. The score is a Likert scale ranging from one to five and the total score goes from 0 to 100, where higher scores represent higher physical disabilities and upper limbs symptoms. The questions refer to the last week and the items in the questionnaire are categorised into the domains: physical function, symptoms and social function.

For goniometry, a plastic manual goniometer with two adjustable arms will be used, which has proved to be

a valid and reliable tool.[25] The active ROM of the shoulder joint will be objectively measured in flexion, abduction, internal and external rotation movements. Participants will be positioned according to Marques,[26] and will perform two repetitions of each movement; the mean of these measures will be considered for the analysis of the results.

Interventions

Participants will undergo six treatment sessions once a week for six weeks, each lasting 40 minutes. The sessions will be conducted individually in a reserved room with adequate lighting and air conditioning adjusted to a temperature of approximately 23 °C. The interventions will be applied by a physiotherapist with previous experience and practice in this protocol. The interventions proposed for each group are described in more details below:

Intervention group

First, a 20-minute MR protocol will be conducted using an adapted approach described in Sinhorim et al.[14] The techniques will be applied emphasizing shear loading, tensile loading and compressive loading, as shown in Table 1 and Figure 2.

Table 1 - Description of myofascial reorganization protocol for breast cancer survivors

Techniques sequence	Techniques description
A. Sternal region	Participant: supine position with knees bent. Therapist: standing in front of the participant's head. Technique: the therapist fixes one hand in the region of the nuchal ligament and the other hand over the sternum, making a smooth and progressive caudal pressure towards the stretcher (1 minute).
B. Anterior ribcage region	Participant: supine position with knees bent. Therapist: standing in front of the participant's head. Technique: the therapist performs pressure and sliding from the xiphoid process, passing through the sternum, the infra clavicular region and ending at the acromion (6 times).
C. Diaphragm reorganization	Participant: supine position with knees bent. Therapist: standing beside the stretcher, in front of the participant's pelvis. Technique: the therapist performs pressure and sliding from the xiphoid process to the lower borders of the last ribs (6 times).
D. Pectoralis major	Participant: supine position with knees bent. Therapist: standing beside the stretcher, in front of the participant's chest. Technique: the therapist fixes one hand on the humerus and applies pressure towards the sternum with the other hand (1 minute).
E. Scapular region 1	Participant: lateral position, without pillow and with 90° of knee and hip flexion. Therapist: standing beside the stretcher, in front of the participant's abdomen. Technique: therapist performs pressure and sliding on the medial and upper border of the scapula (6 times).
F. Scapular region 2	Participant: lateral position, without pillow and with 90° of knee and hip flexion. Therapist: standing beside the stretcher, in front of the participant's abdomen. Technique: therapist departs the scapula from the ribcage and performs scapular mobilization in eight (1 minute).
G. Scapular region 3	Participant: lateral position, without pillow and with 90° of knee and hip flexion. Therapist: standing beside the stretcher, in front of the participant's abdomen. Technique: the therapist places the thumb in the region of teres minor muscle and applies sustained pressure (1 minute).
H. 45° Lateral trunk	Participant: lateral position, without pillow and with 90° of knee and hip flexion. Therapist: standing beside the stretcher, in front of the participant's posterior thorax. Technique: therapist with hands overlapped at 45 ° with the lateral region of the participant's thorax, performs pressure between the 6th and 8th ribs towards the stretcher and shoulder of the participant (1 minute).
I. Lateral trunk region	Participant: lateral position, without pillow and with 90° of knee and hip flexion. Therapist: standing beside the stretcher, in front of the participant's posterior thorax. Technique: therapist positions one hand on the upper thorax and the other on the lower thorax, the upper hand remains fixed and the lower one moves in a caudal direction (1 minute).
J. Thorax reorganization	Participant: lateral position, without pillow and with 90° of knee and hip flexion. Therapist: standing beside the stretcher, in front of the participant's posterior thorax. Technique: therapist places one hand on the anterior region of the last ribs and the other hand in the region of the inferior angle of the scapula, applying twisting pressure in a cranial direction (1 minute).

Immediately after MR protocol, participants will undergo a 20-minute kinesiotherapy protocol. This protocol was created based on previous studies,[9,27-29] and consists of stretching, strengthening, control, and stabilization exercises of shoulder complex, according to Table 2 and Figure 3.

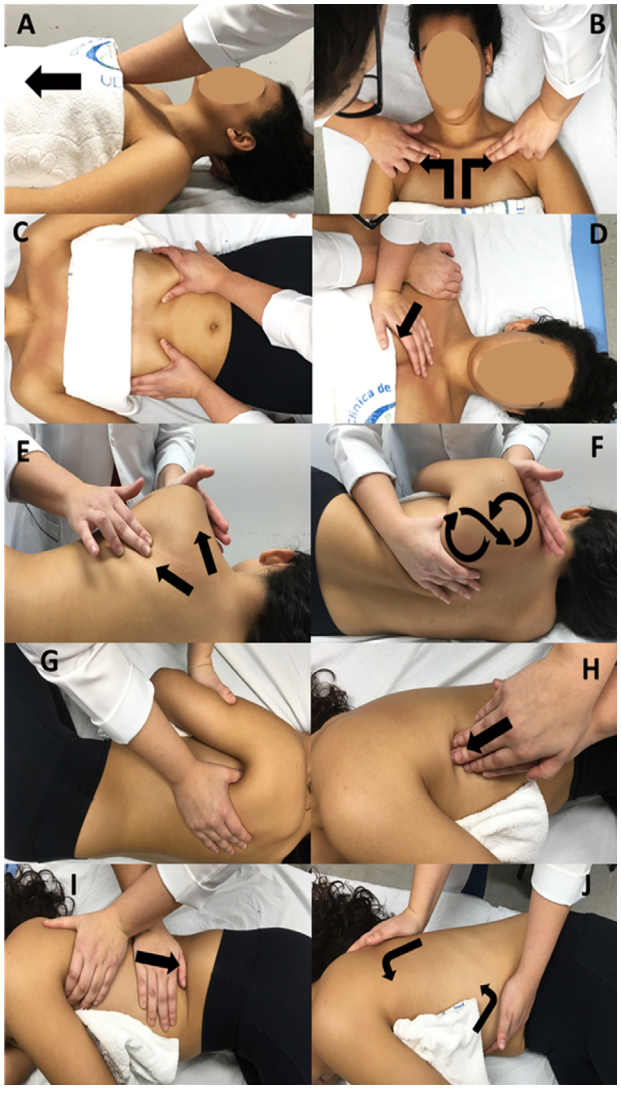

Figure 2 - Myofascial reorganization protocol for breast cancer survivors.

Note: A - Sternal region; B - Anterior ribcage region; C - Diaphragm reorganization; D - Pectoralis Major; E - Scapular region 1; F - Scapular region 2; G - Scapular region 3; H - 45° Lateral trunk; I - Lateral trunk region; J - Thorax reorganization.

Table 2 - Description of the kinesiotherapy protocol for breast cancer survivors based on stretching, strengthening, control and stabilization of shoulder complex

Exercises sequence	Exercises description
1. Stretches	Seating, participants will stretch pectoral, levator scapulae, trapezius and latissimus dorsi. Each position will be held for 1 minute and 30 seconds.
2. Codman's pendulum exercise	Participants will stand with torso flexed over hips at 90° and one arm hanging in a 60° to 90° flexion or abduction position in the scapular plane. Participants will perform circling movements for 1 minute and 30 seconds. Dumbbells up to 1 kg will be used.
3. Scapular mobilization	Participants will stand, face the mirror and perform scapular adduction, abduction, elevation and depression movements. 1 set of 10 repetitions for each movement.
4. Shoulder flexion and abduction	Participants will stand, close to the wall, performs flexion and abduction movements in the scapular plane, sliding her hands along the wall. 1 set of 10 repetitions for each movement.
5. Shoulder elevation with dumbbells	Participants will stand, performs scapular elevation and depression with arms parallel to the body holding dumbbells. 2 sets of 10 repetitions. Dumbbells up to 1 kg will be used.
6. Seated chest press with dumbbells	Participants will be seated with upper limbs in 90° of shoulder flexion and full elbow extension, with pronated forearms, will bring the dumbbells towards the chest performing elbow flexion. 2 sets of 10 repetitions. Dumbbells up to 1 kg will be used.
7. Diagonal patterns exercises	Diagonal D1 flexion: participants will sit, start with shoulder extended, abducted, and internally rotated and end with shoulder flexed, adducted, and externally rotated. Diagonal D2 flexion: participants will sit, start the exercise with shoulder extended, adducted, and internally rotated and end with shoulder flexed, abducted, and externally rotated. 2 sets of 10 repetitions for each diagonal. Dumbbells up to 1 kg will be used.
8. Full can exercise	Participants will stand up, perform shoulder abduction with the elbows extended in the scapular plane, the humerus in external rotation and the thumbs pointing upwards, holding dumbbells. 2 sets of 10 repetitions. Dumbbells up to 1 kg will be used.
9. Scapular stabilization exercise	Participants will stand with shoulders flexed at 90° and hands on the wall, and will perform scapular abduction and adduction keeping hand contact with the wall and elbows extended. 2 sets of 10 repetitions.

Figure 3 - Kinesiotherapy protocol for breast cancer survivors.

Note: 1 - Stretches; 2 - Codman's pendulum exercise; 3 - Active scapular mobilization; 4 - Shoulder flexion and abduction; 5 - Shoulder elevation with dumbbells; 6 - Seated chest press with dumbbells; 7 - Diagonal patterns exercise; 8 - Full can exercise; 9 - Scapular stabilization exercise.

Sham group

SG will start intervention receiving a traditional massage, in regions different from those covered by the IG. The surface smoothing technique will be used, based on Domenico and Wood's classical massage concept.[30] Smooth, rhythmic and circular movements will be made with all the palmar surface, in order to minimize major fascial changes. Traditional massage will last 20 minutes. In the first ten minutes, the participant will stay in dorsal decubitus position and receive the technique in the abdominal region. In the last ten minutes, the participant will adopt the lateral decubitus to receive the massage in the lumbar region. After the traditional massage, the participant will perform the same kinesiotherapy protocol described above, during 20 minutes.

Sample size calculation

Sample calculation was performed using the G-Power® 3.1 software. Variable used was pain intensity in the VAS. Calculation was based on the detection of a 3-point difference between the groups.[31] Considering a power of 80% and α of 5%, we estimated 14 participants per group.

Statistical analysis

Statistical analysis will be conducted based on intention-to-treat analysis. Data will be organised in Excel® (version 2010) and then analysed in SPSS® (Statistical Package for Social Sciences, version 20.0) software. Shapiro-Wilk will be used to check the data normality. Sample characterization will be presented by descriptive statistics. To check the difference between means, the T-Student test or the U-Mann-Whitney test will be used, according to data normality. To verify treatments effects, analysis of variance (ANOVA) for repeated measurements will be used, considering two factors (two-way): time (week 1, week 4, and week 6) and group (IG and SG). Significance level adopted for all tests will be 5%.

Discussion

This study evaluated effects of MR associated with kinesiotherapy on chronic pain treatment and upper limb dysfunction in breast cancer survivors. By using stretching, strengthening and neuromuscular control exercises, kinesiotherapy has been shown to be effective, playing a central role in the rehabilitation process.[12] Whereas MR, by acting on myofascial tissue through stretching, manual pressure and sliding techniques, has shown good results in the treatment of chronic pain and upper limb dysfunctions after breast cancer surgery.[16,17,32]

It is possible that through manual therapy, stimulation of intrafascial sympathetic afferents can trigger changes in the global autonomic nervous system tone, as well as in local circulation and extracellular matrix hydration.[33] Therefore, we believe that associating a MR protocol with kinesiotherapy, we can maximize results, reducing pain and increasing functionality after breast cancer. In this way, we will be able to provide these women with a faster return to socio-labour activities, which has a positive impact on their quality of life.

In a recent systematic review with meta-analysis, it was found that manual therapy decreased the intensity of chronic musculoskeletal pain among breast cancer survivors, however, studies were scarce, with small sample size and low methodological quality.[19] Therefore, during the development of our study, we seek to reduce these gaps by describing and illustrating each of the techniques and using a simple and clear methodology. Furthermore, by adding SG, on one hand we will allow participants of both groups to have the same time of individual treatment with the therapist touch, reducing possible biases. On the other hand, therapists touch can be considered therapeutic by physical and psychological mechanisms,[34] which can make it difficult to identify a difference between groups.

Finally, chronic pain in breast cancer survivors may involve different mechanisms (nociceptive, neuropathic and/or central sensitization).[8] However, randomized clinical trials investigating chronic pain in breast cancer survivors usually do not consider pain mechanisms to address treatment.[35] By associating kinesiotherapy with MR, we can work on more than one mechanism in the same session, maximizing the results. Therefore, if the association of MR with kinesiotherapy prove to have superior effects than isolated kinesiotherapy, we can suggest that pain mechanisms might also be considered when developing a treatment programme for chronic pain of breast cancer survivors.

The study presents some limitations. Due to the proposed interventions nature, responsible therapist for implementing treatment cannot be blinded. In addition, if the intervention will be replicated in other rehabilitation centers, it should only be performed by physiotherapists with experience in MR, which eventually restricts its use. On the other hand, kinesiotherapy protocol allows for greater flexibility, as it can be adapted even for group care, enabling greater reproducibility.

Conclusion

In conclusion, the association of MR with kinesiotherapy will hopefully generate an improvement in chronic pain and functionality of breast cancer survivors. Thus, we believe that MR technique can be routinely included in clinical practice since the early stages of rehabilitation process.

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Authors' contributions

NSC, LMBS, KZ and FFS were responsible for the study conceptualization; NSC, KZ, GMS and FFS, for the methodology. NSC conducted the investigation, while FFS conducted and supervised the whole project. The original draft was written by NSC and LMBS; review and editing were performed by RS and FFS.

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Impact of verbal instructions on pelvic floor contraction in the immediate postpartum

Impacto das instruções verbais na contração do assoalho pélvico no puerpério imediato

Andressa Soares de Azevedo [1*]
Isabella Parente Ribeiro Frota [1,2]
Amene Cidrão Lima [1,2]
Glaucia Nunes Diniz de Oliveira [1]
Mayle Andrade Moreira [1]
Simony Lira do Nascimento [1]

[1] Universidade Federal do Ceará (UFC), Fortaleza, CE, Brazil
[2] Maternidade Escola Assis Chateaubriand (MEAC), Fortaleza, CE, Brazil

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*** Correspondence:** andressa_azevedo@live.com

Abstract

Introduction: Pregnancy predisposes the emergence of pelvic floor dysfunctions (PFD), postpartum being the opportune moment to assess these muscles. **Objective:** To investigate the effect of instructions and verbal feedback on the contraction capacity of pelvic floor muscles (PFM) in postpartum women. **Methods:** Quasi-experimental study with 109 women in the immediate vaginal postpartum at a reference maternity hospital in Fortaleza, Ceará state, Brazil. PFM were visually inspected using the visual contraction scale (0 = no visible contraction; 1 = weak visible contraction; 2 = visible contraction with perineal elevation), in addition to observing the use of accessory muscles and movements. Assessments occurred in consecutive moments: 1 – PFM contraction at a verbal command; 2 – contraction after instructions on structure, function and correct contraction; and 3 – contraction after feedback on the use of accessory muscles and reinforcement of correct contraction. Cochran's Q test and a 5% significance level were used to compare the outcomes between different moments. **Results:** At the first assessment, 15.6% of the postpartum women did not exhibit visible PFM contraction (grade 0). Of these, 70.5% changed their contraction grade after instructions and feedback. At the end, 45.9% of women correctly contracted their PFM with perineal elevation (grade 2) ($p < 000.1$). The use of accessory muscles (abductors, abdominals and gluteal) declined after instructions and feedback ($p < 000.1$). Perineal trauma, forceps delivery, previous information and fear of feeling pain were not associated with contraction grade. **Conclusion:** Instructions and verbal feedback are useful tools for correct PMF contraction in the immediate postpartum.

Keywords: Instructions. Pelvic floor. Physiotherapy. Postpartum period. Women's health.

Resumo

Introdução: *A gestação predispõe o surgimento de disfunções do assoalho pélvico (DAP), sendo o pós-parto momento oportuno para avaliar essa musculatura.* ***Objetivo:*** *Investigar o efeito das instruções e feedback verbais na capacidade de contração dos músculos do assoalho pélvico (MAP) em puérperas.* ***Métodos:*** *Estudo quase-experimental com 109 mulheres no pós-parto vaginal imediato em uma maternidade de referência em Fortaleza, Ceará. Realizou-se inspeção visual dos MAP pela escala visual de contração (0 = nenhuma contração visível; 1 = contração visível fraca; 2 = contração visível com elevação perineal), além de observação da utilização de musculatura e movimentos acessórios. As avaliações foram em momentos consecutivos: 1 - contração dos MAP ao comando verbal; 2 - contração após instruções sobre estrutura, função e correta contração; e 3 - contração após feedback sobre a utilização de musculatura acessória e reforço da correta contração. Para comparação dos desfechos entre os momentos foi utilizado o teste Q de Cochran e significância de 5%.* ***Resultados:*** *No primeiro momento, 15,6% das puérperas não apresentaram contração visível dos MAP (grau 0). Dessas, 70,5% modificaram o grau de contração após instruções e feedback. Ao final, 45,9% das mulheres contraíram corretamente os MAP com elevação perineal (grau 2) (p < 000,1). A utilização de músculos acessórios (adutores, abdominais e glúteos) diminuiu após instruções e feedback (p < 000,1). Trauma perineal, parto a fórceps, informações prévias e medo de sentir dor não se associaram ao grau de contração.* ***Conclusão:*** *Instruções e feedback verbais são ferramentas úteis para contração correta dos MAP no pós-parto imediato.*

Palavras-chave: *Instruções. Assoalho pélvico. Fisioterapia. Período pós-parto. Saúde da mulher.*

Introduction

During pregnancy, hormonal and biomechanical changes, such as a gain in body mass and enlarged uterus, raise the pressure on pelvic floor muscles (PFM). Especially in primiparous women, there is an increase in urethral mobility, changes in muscle tone and activity, heightening the risk of pelvic floor dysfunctions (PFD), such as urinary incontinence (UI) and pelvic organ prolapse.[1,2]

As described in the literature, approximately 30% of women have difficulty in perceiving and activating these muscles when asked for the first time during a physical examination of PFM.[3,4] Given that changes in PFM strength and function occur during the gestational period, and that the perineal region in the postpartum is in a congestive and edematous state, this difficulty may be exacerbated. Pelvic floor muscle training (PFMT) is recommended as first-line treatment, but also as a preventive strategy for UI, thus it is important to assess these muscles correctly.[5]

Assessment and subsequent PFMT after delivery may result in a faster and more effective recovery in preventing and treating PFD.[6] Correct PFM contraction is defined as an approximation between the vagina and anus, with cranial displacement of the central tendon of the perineum, without using the accessory muscles. Due to pain and/or vaginal bleeding, vaginal palpation and manometry may be uncomfortable in the immediate postpartum.[7] In addition to these methods, visual inspection is one of the ways to conduct this assessment. The perineal region can be observed to determine the contraction or not of PFM, as well as the use of accessory muscles and movements.[8]

Although there are literature studies such as that carried out by Assis et al.,[9] showing that verbal instructions on anatomy, PFM functions and correct PFM contraction benefit the function of these muscles and urinary symptoms, it involved multiparous women, not in the context of the immediate postpartum. There is a gap in the literature on the effects of techniques for teaching women correct PFM contraction in the immediate postpartum. As such, this study emphasizes the importance of verbal instructions. Given that PMFT is recommended in the postpartum and that verbal instructions are classic strategies for guiding correct PFM contraction,[7] it is essential to know the difficulties involved in movement, in addition to assessing how this group of women perform these contractions after receiving instructions. Thus, the aim of this study was to investigate the effect of instructions and verbal feedback on the PFM contraction capacity of women in the immediate postpartum.

Methods

This is a quasi-experimental study with a pre and post-test design, conducted with 109 vaginal postpartum women at a reference maternity hospital in Fortaleza, Brazil, between July and September 2018, after approval by the Research Ethics Committee (CAAEE number 88395018.4.0000.5050).

Included were postpartum women with vaginal delivery at 34 weeks or later, between 12 and 72 hours postpartum, and excluded were women using an indwelling urinary catheter, who exhibited cognitive impairment and were hospitalized in an intensive care unit. Non-probability, consecutive or convenience sampling was used and data collection occurred after participants and/or their legal representatives provided written informed consent. The instruments used for data collection were the visual pelvic muscle contraction scale and medical charts.

The pelvic floor muscle contraction scale uses visual inspection to classify perineal contraction movement into three grades: 0 = no visually observed contraction; 1 = weak contraction; and 2 = visualized contraction with perineal elevation and movement in the cranial direction. This scale was developed by Belgian researchers in a study involving 958 postpartum women, exhibiting high interrater reliability (k = 0.832).[7]

The use of accessory muscles and movements was also assessed by visual inspection and characterized as a visible contraction or movement of adductor, gluteal, and abdominal muscles, or apnea, Valsalva maneuver (such as expiration with glottic closure) or pelvic movement (ante and retroversion).

The following variables were extracted from the medical charts: age, schooling, gestational age, parity, use of forceps, episiotomy, laceration occurrence and grade. In addition, the subjects were asked about the presence and fear of perineal pain and whether they had previous information on PFM and PFMT.

Visual inspection of PFM contraction was performed in the gynecology examination room, preserving the women's privacy. The postpartum women were placed on an examination table in dorsal decubitus, with their hips and knees flexed and feet at the trunk level. Data collection followed three consecutive steps (Figure 1):

Assessment 1: PFM contraction at a standardized verbal command ("contract your vagina as if you were trying to hold your urine"). This verbal command was used to facilitate understanding of PFM contraction, using simple language. Contraction was classified by the visual contraction scale and the use or not of accessory muscles and movements were recorded alone or simultaneously (adductor, abdominal and gluteal muscle, apnea, Valsalva maneuver and pelvic movements).

Assessment 2: Next, the postpartum women were instructed about the PFM, their anatomical location and functions by presenting a figure of the genital region. During the explanation, simple language was used with examples of the women's daily situations ("urge to urinate" and "fallen bladder", for example). The participant was then asked to "contract their vagina muscles, pulling inward and upward". Next, the women were asked to contract again, performing three rapid consecutive contractions, and were then reassessed using the visual scale. In order to classify the contraction grade, the last contraction was considered, taking the effect of learning the movement into account.

Assessment 3: Individualized feedback was provided on the use of accessory muscles and movements. Next, they were asked to perform another contraction, which was then classified.

The three assessments were conducted at the same meeting, one after the other. In the present study, grade 2 was considered a correct PFM contraction, visualizing the approximation between the vagina and anus, with cranial displacement of the central tendon of the perineum, without using accessory muscles.

Verbal feedback consisted of specific individualized instructions according to the contraction quality observed in visual inspection. If the adductors were used during PFM contraction, the women were instructed not to try and squeeze their legs together; if they performed expiratory apnea, they could continue breathing normally. At the end of assessment, all the women were asked about the presence of pain and fear of feeling pain when contracting their PFM.[10]

The dependent variables were the visual pelvic floor muscle contraction scale and the use of accessory muscles and movements. The independent variables were the instruction regarding correct PFM contraction and feedback on the use of accessory muscles and movements. The covariables were pain and fear of feeling perineal pain, laceration, episiotomy, forceps delivery and previous information on PFM.

Data collection was carried out by a single examiner, a physiotherapist with experience in the area and at the maternity hospital, who conducted a pilot test before the study. The pilot test was performed with ten women by two researchers, the examiner and a supervisor with extensive experience in women's health physiotherapy. The researchers simultaneously assessed the pilot test participants until they reached agreement on the contraction grade and use of accessory movements. These subjects were not included in the research sample.

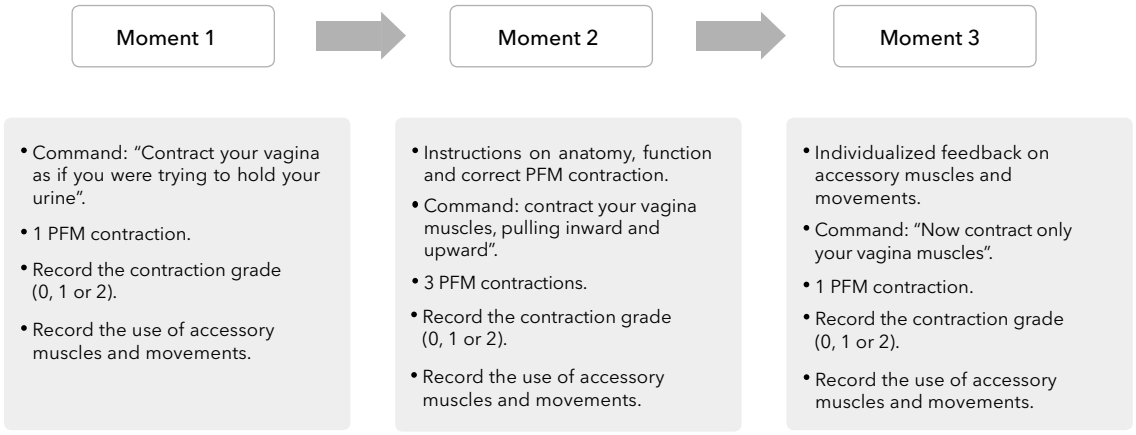

Figure 1 - Data collection flowchart.

Note: PFM = pelvic floor muscles.

With respect to statistical analysis, the data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 20.0 (USA). Descriptive analysis was presented through central tendency and dispersion, using means and standard deviations for the qualitative variables and absolute and relative frequencies for their categorical counterparts. Pearson's chi-squared and Fisher's exact tests were applied to analyze the factors (categorical variables) associated with contraction grades (at moment 1).

Finally, Cochran's Q test was used to determine whether there was a difference in contraction grades between the three assessments, as well as the accessory muscles and movements. This test makes it possible to observe if there is a difference in dichotomous variables between the three assessments, as well as compare the pairs to identify the specific significant difference between assessments. In order to analyze the difference in contraction grades between the assessments, Cochran's test considers only two categories, namely contraction grades 0 and 1, which were compiled into a single category and compared against grade 2. A 5% significance level ($p < 0.05$) was established for all the tests.

Results

Most of the 109 women included (n = 48) were aged between 18 and 25 years, with an average of 24.3 years (minimum of 14 and maximum of 42 years). The other characteristics are described in Table 1.

PFM contraction grade at the first assessment showed that 17 (15.6%) postpartum women did not exhibit visible contraction (grade 0), 56.9% grade 1 and 27.5% grade 2. Among those who obtained grade 0, 70.5% (n =12) changed their contraction grade at the second assessment, and only three women were still unable to contract PFM at the third. At the end of assessment, 45.9% (n = 50) of the women performed contraction with approximation between the vagina and anus and cranial displacement of the central tendon of the perineum, achieving correct PFM contraction (grade 2) ($p < 0.001$).

The adductor, abdominal and gluteal muscles were the most recruited during PFM contractions, but instructions and mainly verbal feedback at assessment 2 resulted in decreased use of all the accessory muscles and movements evaluated ($p < 0.001$) (Table 2). At assessment 1, only three (2.7%) women obtained grade 2 and did not use any accessory muscle or movement, while in the second and third assessments, these numbers were four (3.6%) and 29 (26.6%) women, respectively (data not presented in the tables).

There was no association between episiotomy, use of forceps, previous information on PFM and fear of feeling pain during contraction and contraction grade according to the scale applied at assessment 1 (Table 3). It is important to note that no adverse event occurred during or after assessments.

Table 1 - Clinical and sociodemographic characteristics of the participants (n = 109)

Variables	n	%	Mean ± SD
Age			24.3 ± 6.9
Pregnancies			
1 pregnancy	53	48.6	
2 pregnancies	27	24.7	2.0 ± 1.4
> 3 pregnancies	29	26.6	
Gestational age at delivery			
34-36 weeks	16	14.6	
37-40 weeks	82	75.2	38.0 ± 3.7
41- 42 weeks	11	10.0	
Parity			
Primiparous	56	51.3	-
Multiparous	53	48.6	
Use of forceps			
Yes	3	2.7	-
No	106	97.2	
Episiotomy			
Yes	7	6.4	-
No	102	93.6	
Laceration			
Yes	73	66.9	-
No	36	33.0	
Laceration grade*			
1	34	46.5	
2	29	39.7	-
3	4	5.4	
Schooling			
Elementary	34	31.1	
Secondary	56	51.3	-
University	7	6.4	
Unknown	12	11.0	

Note: *Unavailable data (n = 6); SD = standard deviation.

Table 2 - Comparison between the use of accessory muscles and movements (AAM) and contraction grades during the assessment period (n = 109)

AMM	A1 n (%)	A2 n (%)	A3 n (%)	p-value
Adductor	62 (56.8)	59 (54.1)	28 (25.6)	< 0.0100*[a]
Abdominal	55 (50.4)	51 (46.7)	23 (21.1)	< 0.0100*[a]
Gluteal	47 (43.1)	34 (31.1)	14 (12.8)	< 0.0100*[a]
Apnea	36 (33.0)	31 (28.4)	7 (6.4)	< 0.0100*[a]
Pelvic mov.	22 (20.1)	8 (7.3)	2 (1.8)	< 0.0100*[b]
Valsalva	9 (8.2)	5 (4.5)	2 (1.8)	0.0100*[c]
Contraction grades**				
0	17 (15.6)	5 (4.6)	3 (2.7)	
1	62 (56.9)	56 (51.4)	56 (51.4)	< 0.0001*[b]
2	30 (27.5)	48 (44.0)	50 (45.9)	

Note: A = assessment; [a]Accessory muscles (adductors, abdominals and gluteal) and apnea: A1 vs. A3;A2 vs. A3. [b]Pelvic movement and contraction grades: A1 vs. A2; A1 vs. A3. [c]Valsalva: A1 vs. A3. *Cochran's test. **Cochran's test considers only two categories (for this test grades 0 and 1 were compiled into a single category, which was compared to grade 2) to analyze the difference in contraction grades between the assessments. Pelvic mov. = pelvic movement.

Table 3 - Assessment of the association between factors that could interfere in contraction quality at moment 1

Reasons for interference	Grade 0 n (%)	Grade 1 n (%)	Grade 2 n (%)	p-value
Previous information (n = 34)	7 (20.5)	15 (44.1)	12 (35.2)	0.19*
Presence of pain (n = 20)	6 (30.0)	7 (35.0)	7 (35.0)	0.05*
Fear of pain (n = 27)	2 (5.4)	14 (37.8)	11 (29.7)	0.13*
Schooling (n = 97)				
Elementary (n = 34)	5 (14.7)	18 (52.9)	11 (32.4)	
Secondary (n = 56)	7 (12.5)	34 (60.7)	15 (26.8)	0.42**
University (n = 7)	1 (14.3)	3 (42.9)	3 (42.9)	
Procedures				
Episiotomy (n = 7)	3 (42.9)	3 (42.9)	1 (14.3)	0.11**
Forceps (n = 3)	2 (66.7)	1 (33.3)	0 (0.0)	0.11**
Laceration (n = 73)	11 (15.1)	43 (58.9)	19 (26.0)	0.76*

Note: *Pearson's chi-squared test. **Fisher's test.

Discussion

Most of the women in the immediate postpartum exhibited difficulty in correctly contracting their PFM when asked to do so without adequate guidance. However, with standardized instructions and individualized feedback, there was a change in PFM contraction grade (assessment 1 versus 2) and decreased use of accessory muscles and movements (assessment 2 versus 3), determined by visual inspection during the three assessments. This result reflects the importance of physiotherapists' recognizing impaired muscle functions and adjusting the verbal command, given that at assessment 2 verbal instructions on anatomy, function and correct PFM contraction favored PFM contraction, while at assessment 3, feedback focused on accessory muscles and movements, enhancing PFM contraction coordination and specificity.

PFMT is one of the main approaches to prevent and treat PFD during the gestational period and after delivery, contributing to the recovery of PFM function, altered by physiological and biomechanical changes inherent to pregnancy and delivery.[11,12] Saboia et al.[13] found that all the studies they assessed used PFMT as the main prevention strategy for urinary incontinence (UI) in the postpartum and that, compared to routine care, PFMT is effective in preventing UI in the immediate and late postpartum.

In this respect, given that PFMT is essential in preventing and treating PFD, it is important that women learn to perform correct perineal contractions to enable adequate PFMT after delivery. In the present study, 72.5% of the women (n = 79) were unable to correctly contract their PFM at assessment 1. This finding corroborates the pioneering study by Bø et al.,[14] where up to 30% of the women could not perform a correct contraction on the first attempt. In addition to difficulties with body perception and fear of perineal pain, the present study was conducted in a public hospital and most participants did not receive prenatal physiotherapy, with the assessments conducted here being the first contact with the PFM topic for 75% of the women. However, even at this single contact, the women were able to understand the instructions and achieve better PFM results, that is, to learn or improve contraction. The fact that 70.5% of women that could not contract their PFM changed their contraction grade after instructions and feedback confirms the findings of Hay-Smith et al.[15] on the importance and effectiveness of verbal instructions in PMFT. Thus, physiotherapy instructions in the immediate postpartum are relevant and may be potential modifiers of contraction capacity and PFM coordination.

The adductors were the most widely used accessory muscles, followed by the abdominals and gluteals. This is similar to the results of a Belgian study conducted by Neels et al.,[7] where the accessory muscles most widely used by the postpartum women were the abdominals, followed by apnea and gluteal movement. However, Sapsford et al.[16] found that abdominal muscle activity results from maximum PFM activation. Thus, when asked to perform PFM contractions, the postpartum women contracted their abdominal muscles in order to better execute the perineal movement. In our study, only rapid PFM contractions were used, with no orientation for sustained contractions, which could increase the use of accessory muscles or cause muscle fatigue.

Kruger et al.[17] found that abdominal and hip rotator muscle contraction does not activate PFM enough to provide a training effect, given that the pressures generated on the PFM were greater during isolated PFM contraction, which should continue to be recommended, following the principle of specificity for muscle strengthening. In the present study, verbal feedback aimed at isolated PFM contraction, resulting in 45.8% of the women achieving correct contraction (grade 2). These data corroborate Vermandel et al.,[18] who studied 958 postpartum women, where verbal instruction was also confirmed as an effective tool for guiding PFM contraction.

Recent studies demonstrate that postpartum perineal pain is frequent between 70 and 90% of women.[19,20] The low incidence of perineal pain (18.3%, n = 20) found in the present study may be related to the low indices of severe lacerations (5.4%) and episiotomy (6.4%) in our sample, as well as in a study conducted in São Paulo by Francisco et al.,[21] who reported that 18.5% complained of this pain.

In contrast to what was expected, forceps delivery and episiotomy exhibited no relationship with contraction grade or the findings reported by Vermandel et al.[18] Nor were previous information on PFM and schooling associated. These results demystify the reluctance to guide PFMT for women who suffered from perineal trauma and the notion that low schooling would be a limitation for understanding correct PFM contractions. Nevertheless, only educational strategies may not be enough to strengthen PFM and, for this reason, new postpartum PFMT strategies should be stimulated.[22]

Although vaginal palpation and manometry are widely used by physiotherapists to assess PFM function and strength,[8] in the present study visual PFM inspection can be considered a limitation. However, this is the first study on Brazilians in the immediate vaginal postpartum, given that this period exhibits a limitation in the use of intravaginal methods due to vulvar and perineal edema, pain, discomfort, lochia, sutures and increased risk of infection. On the other hand, the postpartum period is opportune for instructing women on the benefits of PFMT in the treatment and prevention of dysfunctions.

The results should be interpreted with caution because of the limitations inherent to a quasi-experimental design, such as the absence of a control group, randomization and the lack of rater blinding. However, since the assessments were performed at

consecutive moments, it is believed that the effect observed is due to the instructions and feedback provided. Another limitation is subjective assessment; however, a scale with high interrater reliability was used (k = 0.832),[7] which can be applied in different environments by different professionals, in addition to being a simple low-cost assessment method.

We highlight the originality and contribution of this study, which allows broadening the approaches in the immediate postpartum and facilitating the clinical practice of physiotherapists in maternity hospitals. In addition, a number of factors contributed to uniform collection and better internal validity, such as a standardized verbal command for PFM contraction, examiner training, data collection pilot test and assessments on the first three days postpartum.

Finally, although the study was carried out in women with low socioeconomic conditions, 1/3 with low schooling and only 30% with previous information on PFM, verbal instructions improved the women's capacity to perform a correct contraction in the immediate postpartum.

Conclusion

Most of the women in the immediate postpartum had difficulty in correctly contracting and coordinating PFM. The verbal instructions and feedback were useful in promoting correct PFM contraction and decreasing the use of accessory muscles and movements. Moreover, the visual inspection used is a simple, noninvasive and low-cost method that physiotherapists can perform in maternity hospitals in the immediate postpartum, thereby providing better quality care. In order to assess contraction capacity over time, longitudinal studies and randomized clinical trials are recommended.

Authors´ contributions

ASA, IRPF e SLN were responsible for the project development; ASA, IRPF and GNDO, for the data collection; and ASA, MAM and SLN, for the data analysis. The manuscript was written by ASA, IRPF, ACL, GNDO and SLN, and edited by ASA, IRPF, ACL, MAM and SLN. All authors approved the final version.

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Genital self-image, sexual function and pelvic floor discomfort in COVID-19 pandemic scenario

Autoimagem genital, função sexual e desconforto do assoalho pélvico no cenário pandêmico de COVID-19

Paula Somavilla *
Adriane Schmidt Pasqualoto
Melissa Medeiros Braz

Universidade Federal de Santa Maria (UFSM), Santa Maria, RS, Brazil

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*** Correspondence:** paula_slla@hotmail.com

Abstract

Introduction: Sexual health is an important area of women's health, comprising aspects that can be affected by stressors, such as in the COVID-19 pandemic scenario. **Objective:** To investigate genital self-image, sexual function and pelvic floor discomfort in young female university students during the COVID-19 pandemic, comparing these factors with their sexual activity. **Methods:** This study is a quantitative and cross-sectional survey of young female university students during the COVID-19 pandemic period, carried out through an online form. To assess the variables, the Female Sexual Function Index, Pelvic Floor Distress Inventory, and Female Genital Self-Image Scale were used. **Results:** 182 women participated in the study, and the general mean age was 22.06 ± 2.75 years. Sexually active women (n = 128) had significantly better genital self-image compared to inactive women (22.87 ± 2.92 vs. 20.85 ± 4.41; p = 0.004). Likewise, better genital self-image was also observed in women without sexual dysfunction (23.36 ± 2.72 vs. 21.11 ± 2.96; p < 0.001) and in those who reported fewer symptoms of pelvic floor discomfort (p = 0.014). **Conclusion:** A positive genital self-image was associated with fewer sexual dysfunctions, better sexual function, and fewer symptoms of pelvic floor discomfort. Furthermore, sexual activity is associated with a better genital self-image.

Keywords: Body image. COVID-19. Pelvic floor disorders. Sexual health. Women's health.

Resumo

Introdução: *A saúde sexual é uma área importante da saúde da mulher, compreendendo aspectos que podem ser afetados por estressores, como no cenário de pandemia da COVID-19.* ***Objetivo:*** *Investigar a autoimagem genital, função sexual e desconforto do assoalho pélvico em jovens universitárias durante a pandemia de COVID-19, comparando esses fatores com sua atividade sexual.* ***Métodos:*** *Este estudo é uma pesquisa quantitativa e transversal com jovens universitárias durante o período da pandemia de COVID-19, realizada por meio de formulário online. Para avaliar as variáveis, foram utilizados o Índice de Função Sexual Feminina, Inventário de Desconforto do Assoalho Pélvico e Escala de Autoimagem Genital Feminina.* ***Resultados:*** *Participaram do estudo 182 mulheres, com média de idade de 22,06 ± 2,75 anos. Mulheres sexualmente ativas (n = 128) apresentaram autoimagem genital significativamente melhor em comparação às mulheres inativas (22,87 ± 2,92 vs. 20,85 ± 4,41; p = 0,004). Da mesma forma, melhor autoimagem genital também foi observada em mulheres sem disfunção sexual (23,36 ± 2,72 vs. 21,11 ± 2,96; p < 0,001) e naquelas que relataram menos sintomas de desconforto do assoalho pélvico (p = 0,014).* ***Conclusão:*** *Uma autoimagem genital positiva foi associada a menos disfunções sexuais, melhor função sexual e menos sintomas de desconforto do assoalho pélvico. Além disso, a atividade sexual está associada a uma melhor autoimagem genital.*

Palavras-chave: *Imagem corporal. COVID-19. Distúrbios do assoalho pélvico. Saúde sexual. Saúde da mulher.*

Introduction

Coronavirus disease 2019 (COVID-19) is a severe acute respiratory syndrome, which may initially show symptoms such as fever, cough, myalgia and fatigue. In March 2020, after spreading across continents with a high number of victims, the World Health Organization declared a pandemic situation.[1]

In the same way as countries in other continents, Brazil has also adopted strategies to contain the pandemic, such as distance and social isolation, quarantine, masks wearing, reduction of agglomerations, and other strategies.[2] Several universities have modified their teaching methods to avoid agglomerations and reduce contagion, as was the case at the Universidade Federal de Santa Maria, which instituted a special home exercise scheme through Resolution N. 24/2020.[3]

However, these strategies, along with the chaotic scenario of the pandemic, are aspects that can directly affect the individual's mental health. In the study by Pedrozo-Pupo et al.[4] carried out in Colombia, 15% of the participants reported high levels of stress associated with the COVID-19 pandemic. Among students, the impact of the pandemic also seems to have consequences, and there are studies that already point to a negative impact on the mental health of university students, with worsening levels of stress, anxiety, sleep quality, loneliness and depression.[5,6] In addition, some studies carried out among university students have observed that female participants had higher levels of stress, and which is associated with worse levels of mental health in this pandemic period.[7,8]

Linked to mental health, sexual health is an important and delicate area that is also being affected and needs attention in this pandemic moment. As a complex area, sexual health seems to be affected by the psychosocial effects of the pandemic, especially female university students. Studies developed in this period already show a direct impact of the COVID-19 pandemic on sexual health and quality of life, with decreased desire and frequency of sexual intercourse.[9-11]

However, even before the effects of the pandemic, sexual dysfunction already had negative impacts on sexual health. These conditions also interfere with the individual's quality of life, acting on physical, emotional and social aspects, which are associated with their well-being.[12,13] Female sexual dysfunction is linked, among other causes, to dysfunctions of the pelvic floor muscles.[14] Bezerra et al.[15] observed that even young and female university students - with access to current information and notions about female anatomy and physiology - may have difficulty in fully and effectively performing their own sexuality, with a high prevalence of sexual dysfunction.

In addition, factors such as anxiety, stress and depression seem to be closely associated with the dysfunctions of this musculature, including conditions of hypertonia, urinary incontinence and painful symptoms of pelvic myofascial disorders.[16,17] As already mentioned, these factors are symptoms that have become common and are part of the routine of many students in this pandemic period.

Discomfort in the pelvic floor can also be attributed to the dysfunctions of this musculature, and compromise sexual function. Due to discomfort, their domains - desire, arousal, lubrication, orgasm, satisfaction and pain - can become particularly vulnerable.[18]

Finally, genital self-image is also a factor that has relevance in sexual function. A study conducted by Handelzalts et al.[19] showed that a low genital self-image was the main variable associated with a worse general sexual function, being even more relevant than depression and age.

Considering sexual health as an area with a certain sensitivity to the negative impacts of the pandemic, it is essential to investigate the changes that this scenario of social isolation, modification in the way of teaching for the online regime, significant increase in stress levels and worsening of mental health can trigger in this domain. Thus, this research aims to investigate the genital self-image, sexual function and discomfort in the pelvic floor of young female university students during the COVID-19 pandemic, comparing these factors with their sexual activity.

Methods

Characterized as observational research, with a quantitative approach and cross-sectional character, the present study evaluated genital self-image, sexual function and discomfort in the pelvic floor in young female university students during the COVID-19 pandemic, comparing these factors with their sexual activity through online questionnaires.

Female participants aged between 18 and 29 years, students from undergraduate and graduate courses at a public university in the interior of Rio Grande do Sul, Brazil, who were receiving classes through the special home exercise scheme, were included in the research. Replies on the form that were duplicated, as well as participants who had a baby less than two months ago, were excluded.

The sample calculation was estimated to obtain two-tailed significance level (α) of 5% and power (1 - β) of 90%. We assume an average effect size (ES = 0.3) for the correlation between the total FSFI and FGSIS scores. Thus, a total sample of 112 sexually active women was considered adequate for the correlation analysis. The sample calculation was performed using the GPower 3.1.9.2 software.[20]

Data collection was carried out between the months of September and December 2020, a period in which the containment measures of COVID-19 were in effect. The research was carried out after approval by the institutional Research Ethics Committee under the No. 3,415,891. The questionnaire was applied through a form created on the Google Forms platform, which was shared among the participants through e-mails and a link to the form, generated by the website. The form contained the appropriate instructions for understanding and answering the questions.

The Free and Informed Consent Term was presented on the first page of the form, and only the participants who chose the "accept" option were able to answer the form. All instruments were self-answered. The identification form used was an adaptation by Herbenick and Reece,[21] composed of specific questions, open and closed, about sociodemographic and gynecological data referring to personal data, anamnesis, complaints and sexual activity.

Then, the Female Sexual Function Index (FSFI) questionnaire was applied, which assesses sexual function and was translated into Portuguese in 2008.[22] The FSFI consists of 19 questions that have five to six response options, two of which are related to desire, four to arousal and four to lubrication, three to orgasm, three to satisfaction and, finally, three questions about pain. The score for each dimension varies between 1.2 and 6 or between 0 and 6, and the total FSFI score varies between 2 and 36, indicating better sexual function at high scores. The cut-off point of the FSFI was adopted as a score of 26.55, in order to predict sexual dysfunction for scores below this value. The following cut-off points were used to analyse the domains: desire (4.28), excitation (5.08), lubrication (5.45), orgasm (5.05), satisfaction (5.04), and pain (5.51).[23] Values below this cut-off point indicate dysfunction in each domain.

Likewise, the Pelvic Floor Distress Inventory (PFDI-20) is a questionnaire that has also been validated and translated into Brazilian Portuguese. It consists of 20 questions divided into three domains (bladder, bowel, pelvis) in its subscales: Pelvic Organ Prolapse Disorder Inventory (POPDI-6), Colorectal-Anal Disorder Inventory (CRADI-8) and Urinary Distress Inventory (UDI-6). It begins by asking whether the patient has the symptom described in each item. If the answer is yes, there is a classification score in which the patient can choose the answer, with a subscale score from 0 to 100. The higher the score, the greater the discomfort of symptoms of pelvic floor dysfunction (PFD).[24]

The Female Genital Self-Image Scale (FGSIS) offers an effective means of assessing genital self-image.[19,25] FGSIS has seven items and assesses women's feelings and beliefs about their own genitals, using a 4-point response scale (strongly agree, agree, disagree, strongly disagree). The scores obtained in each of the seven items are added to the end, ranging from 7 to 28, with higher scores indicating a more positive genital self-image.[26]

For statistical analysis, categorical variables were analysed descriptively by means of simple frequency, and percentages and numerical ones by means of measures of position and dispersion. The data were considered with non-parametric distribution through the Kolmogorov-Smirnov test. Thus, the Mann Whitney U Test was used to compare sexual function and the total FGSIS score and to compare FGSIS scores, PFDI-20 and its subscales between sexually active and inactive university students. The effect size (ES) of the significantly different comparisons was determined according to Cohen[27] by the formula $z/\sqrt{N}$: ≤ 0.10 - null effect; 0.11 to 0.29 - weak effect; 0.30 to 0.49 - moderate effect; and ≥ 0.50 - large effect. Spearman's correlation coefficient was used to correlate the total FGSIS score with the FSFI domains. The classification regarding the strength of the correlation followed the criteria of Malina: rho < 0.30 as low correlation; 0.30 ≤ rho ≤ 0.60 as a moderate correlation; and rho > 0.60 as a high correlation.[28] To measure the effect of the correlation, the determination coefficient (R^2) was used. For all tests $p < 0.05$ was adopted. All statistical analyses were performed using the SPSS 22.0 program.

Results

At the end of the data collections, 202 responses were obtained from the participants, and 182 responses were analysed using the eligibility criteria. For data analysis, the participants were divided into two groups: the first was composed of sexually active women, defined as those who had sexual intercourse (penetrative or not) in the last four weeks, totalling 128 women with a mean age of 22. 27 ± 2.87; the second group was composed of sexually inactive women, defined as those who did not have sexual intercourse in the last four weeks (penetrative or not), totalling 54 women with a mean age of 21.57 ± 2.39 years. The general mean age of the participants was 22.06 ± 2.75 years. Table 1 shows the characterization of the study participants.

Table 1 - Characteristics of the study participants

Characteristics	**Sexually active women** (n = 128) Mean ± SD or (%)	**Sexually inactive women** (n = 54) Mean ± SD or (%)	**p**	**Effect size**
Age (years)	22.27 ± 2.87	21.57 ± 2.39	0.099	-
Ethnicity				
White	107 (83.59)	39 (72.22)		
Black	9 (7.04)	3 (5.56)	0.064	-
Other	12 (9.37)	12 (22.22)		
Relationship status				
With a partner	90 (70.31)	10 (18.52)	< 0.001*	0.476
Without partner	38 (29.69)	44 (81.48)		
Education				
Undergraduate degree	111 (86.72)	50 (92.59)	0.317	-
Graduate degree	17 (13.28)	4 (7.41)		
Sexual orientation				
Heterosexual	100 (78.12)	37 (68.52)		
Homosexual	4 (3.13)	2 (3.70)	0.164	-
Other	24 (18.75)	15 (27.78)		
Contraceptive pill				
No	48 (37.50)	27 (50.00)	0.139	-
Yes	80 (62.50)	27 (50.00)		
Symptoms of SUI				
No	97 (75.78)	40 (74.07)	0.852	-
Yes	31 (24.22)	14 (25.93)		
Symptoms of UUI				
No	85 (66.41)	37 (68.52)	0.864	-
Yes	43 (33.59)	17 (31.48)		

Note: SD = standard deviation; SUI = stress urinary incontinence; UUI = urgent urinary incontinence; *p < 0.05.

There was a predominance of white women in both groups. Regarding the relationship status, there was statistical significance ($p < 0.001$) when compared to the sexual habits that divide the groups: 70.31% of the participants with a partner are sexually active. Among women without a partner, on the other hand, there was a predominance of those sexually inactive over active women, with 81.48% and 18.52%, respectively.

The groups were homogeneous in relation to the other sample characterization items. However, it is important to emphasize the presence of urinary incontinence symptoms observed through the urinary distress inventory subscale present in the PFDI-20 questionnaire (Table 1).

The values referring to the analysis of the FGSIS between the groups are shown in Table 2. When comparing the overall score of each group, sexually active women had a better genital self-image compared to the group of sexually inactive women ($p < 0,004$). The same occurred when analysing the items security ($p = 0,016$), appearance ($p = 0,021$), comfort ($p = 0,007$), smell ($p = 0,023$) and shame ($p = 0,003$), which showed significantly higher values in sexually active women.

Table 3 shows the comparisons of the total FGSIS score between sexually active women (n = 128) with and without sexual dysfunction, according to the FSFI domains.

Table 2 - Comparison of total scores and FGSIS items between sexually active and inactive women during the COVID-19 pandemic

Characteristics	**Sexually active women** (n = 128) Mean ± SD or (%)	**Sexually inactive women** (n = 54) Mean ± SD or (%)	**p**	**Effect size**
Security	3.36 ± 0.66	2.96 ± 0.99	0.016*	0.178
Appearance	3.32 ± 0.67	2.96 ± 0.95	0.021*	0.171
Comfort	3.21 ± 0.75	2.81 ± 0.93	0.007*	0.200
Smell	3.25 ± 0.61	2.94 ± 0.81	0.023*	0.168
Operation	3.38 ± 0.66	3.24 ± 0.75	0.292	-
Exam	3.02 ± 0.18	3.00 ± 0.19	0.598	-
Shame	3.34 ± 0.71	2.93 ± 0.89	0.003*	0.218
Total score	22.87 ± 2.92	20.85 ± 4.41	0.004*	0.214

Note: FGSIS = Female Genital Self-Image Scale; COVID-19 = Coronavirus disease 2019; SD = standard deviation; *$p < 0.05$.

Except for the sexual desire domain, in all other domains of sexual function, women without sexual dysfunction had the highest total FGSIS score. However, there was a significant difference only in the orgasm ($p = 0.023$) and pain ($p = 0.018$) domains and in the total FSFI score ($p < 0.001$). The ES of significant comparisons was considered weak for orgasm and pain, but moderate for the total FSFI score.

The Table 4 shows the values of the correlations between the total FGSIS score and the FSFI domains, the PFDI-20 subscales and the total PFDI-20 score of sexually active university students in the last four weeks.

The total FGSIS score showed a significant and positive correlation with orgasm (rho = 0.225), pain (0.247) and with the total FSFI score (0.216). The variation in the total FGSIS score can be explained by, respectively, 5.1%, 6.1% and 4.7% of the variation of the FSFI values in the orgasm and pain domains and of the total FSFI score. The total score of FGSIS also showed a significant and negative correlation with the score of CRADI-8 (-0.237), UDI-6 (-0.189) and PFDI-20 (-0.216). The variation in the total FGSIS score can be explained by, respectively, 5.6%, 3.6% and 4.7% of the variation in the values of CRADI-8, UDI-6 and PFDI-20. The strength of all correlations was considered low.

The PFDI-20, when comparing the values of the total score and of each domain between sexually active and inactive women, did not present a statistically significant difference. However, the average of the general score and of each domain were higher in the group of sexually inactive women, with 43.83 ± 37.29 and 48.51 ± 47.25, respectively.

Table 3 - Comparison of the total FGSIS score between sexually active women (n = 128) with and without sexual dysfunction, according to the FSFI domains

Sexual dysfunction	n (%)	Total score of FGSIS Mean ± SD	p	Effect size
Desire				
No	42 (32.81)	22.57 ± 3.29	0.547	-
Yes	86 (67.19)	23.01 ± 2.73		
Arousal				
No	78 (60.94)	23.06 ± 2.81	0.345	-
Yes	50 (39.06)	22.56 ± 3.09		
Lubrification				
No	55 (42.97)	23.18 ± 2.84	0.292	-
Yes	73 (57.03)	22.63 ± 2.97		
Orgasm				
No	67 (52.34)	23.46 ± 2.61	0.023*	0.201
Yes	61 (47.66)	22.21 ± 3.11		
Satisfaction				
No	85 (66.41)	23.13 ± 2.72	0.192	-
Yes	43 (33.59)	22.35 ± 3.25		
Pain				
No	71 (55.47)	23.45 ± 2.69	0.018*	0.210
Yes	57 (44.53)	22.14 ± 3.06		
Total score FSFI				
No	100 (78.12)	23.36 ± 2.72	< 0.001*	0.317
Yes	28 (21.88)	21.11 ± 2.96		

Note: FGSIS = Female Genital Self-Image Scale; FSFI = Female Sexual Function Index; SD = standard deviation; *p < 0.05.

Table 4 - Relation between the total score of the FGSIS and the FSFI domains, the subscales of the PFDI-20 and the total score of the PFDI-20 in sexually active university students (n = 128)

FSFI Domains	Spearman's Rho	p	R^2
Desire	0.012	0.896	-
Arousal	0.169	0.057	-
Lubrification	0.120	0.176	-
Orgasm	0.225	0.011*	0.051
Satisfaction	0.107	0.229	-
Pain	0.247	0.005*	0.061
Total Score FSFI	0.216	0.014*	0.047
POPDI-6 (Pelvic Organ Prolapse Distress Inventory)	-0.129	0.146	-
CRADI-8 (Colorectal-Anal Distress Inventory)	-0.237	0.007*	0.056
UDI-6 (Inventory urinary distress)	-0.189	0.033*	0.036
PFDI-20 (Pelvic Floor Distress Inventory)	-0.216	0.014*	0.047

Note: FGSIS = Female Genital Self-Image Scale; FSFI = Female Sexual Function Index; R^2 = determination coefficient. *p < 0.05.

Discussion

In accordance with our objectives, the analysis of genital self-image and sexual function showed interesting results when compared. In each domain of sexual function, women without dysfunction had better genital self-image, except for the sexual desire domain. At this point, consequently, women with some sexual dysfunction have a worse self-image about their genitals. Furthermore, it is observed that the better women's genital self-image, the better their sexual function in the orgasm domain and less pain dysfunction. Good genital self-image was associated with better overall sexual function.

Sexual function is only analysed in sexually active women. We defined sexually active women as those who had some sexual activity (penetrative or not) with a partner in the last four weeks before participating in the survey. Thus, sexually inactive women are those who did not have sexual activity during the same period. In our study, sexually active women had better genital self-image, with a significantly higher mean total score than sexually inactive women.

Sexual activity, when compared to the relationship status, shows a significant number of sexually active women with a partner. However, a part of women with a partner were not sexually active, which may have been influenced by social distance for those who do not cohabit with their partner, which is culturally common for younger women. The presence of UI was also a relevant point, and, although without statistical significance between the groups, there was a predominance of UUI symptoms in both. Regarding genital self-image, sexually active women had a mean total score significantly higher than sexually inactive.

Improved genital self-image was associated with fewer symptoms related to colorectal and urinary disorders, as well as pelvic floor discomfort in general. The presence of UI symptoms had a higher prevalence than recently published studies. In the cross-sectional study by Ural et al.,[29] carried out in Turkey, 1,397 university students with an average age of 20.27 ± 1.69 years were evaluated. The prevalence of UI was 18.4% (n = 258), and there was no information regarding UI subtypes.

Despite this, the values observed both in our study and by Ural et al.[29] are in accordance with the systematic review carried out by Almousa and Bandin van Loon,[30] where 15 studies analysed showed a variation of 1% to 42.2% in the prevalence of UI symptoms. The prevalence of UI subtypes differed between the studies analysed, however, the reported average of UI was higher. It is suggested that the emotional factors triggered by the COVID-19 pandemic contributed to the predominance of UUI symptoms in our study, since symptoms of anxiety and depression may be related to this incontinence subtype.[31]

It is noteworthy that because we opted for the online survey format, women may have felt safer and less constrained to give honest answers to the questionnaire. In a survey of face-to-face interviews, we need to consider the discomfort a woman experiences when admitting to shedding urine in everyday situations, especially young women.

Findings about the relationship between genital self-image and sexual activity are in line with research already published. In 2018, Rowen et al.[32] conducted a study in the United States with a sample of 3,143 women with an average age of 46 ± 13 years, and found that women dissatisfied with their genital appearance were less likely to be sexually active. Among sexually active women, sexual frequency was lower in women dissatisfied with their genital image.

In our study, the FGSIS security, appearance, comfort, smell and shame items scored significantly worse in sexually inactive women. Rowen et al.,[32] pointing out that genital self-image is worse in sexually inactive women, emphasize that it can be influenced by sociocultural factors and the search for an idealized image, especially in young women, who can adopt practices of genital self-care and hair removal intimate in an attempt to change the appearance of their genitals.

Rowen et al.[32] compared their findings with the study carried out in 2010 by Herbenick and Reece,[21] which validated the current FGSIS, and found similar results. Herbenick and Reece[21] compared FGSIS values with the sexual function of their sample, and even though they are not current, the results were similar to the findings of our study. The authors observed a positive correlation between genital self-image and FSFI domains ($p < 0.001$), with the exception of the desire domain ($p = 0.18$).

Regarding the effects of the COVID-19 pandemic on these variables, there are divergences in the literature. Fuchs et al.[10] evaluated 764 women and compared the data before and during the pandemic, where a decline

in the quality of sexual life was found, worsening sexual function and a decrease in the frequency of sexual intercourse. When asked about the reasons for the latter, 41.5% of women reported that the cause was associated with their partner's isolation, 39.3% reported a lack of desire caused by stress, and 16% reported disagreements with their partners. Finally, 3.2% of women feared that COVID-19 could be transmitted through sexual contact.

In contrast, Yuksel and Ozgor,[33] in a study with 58 women who assessed sexual function during the COVID-19 pandemic, reported an increase in the frequency of sexual intercourse and sexual desire. Despite this, their FSFI values were significantly better before the pandemic. It is worth mentioning that Yuksel and Ozgor[33] evaluated only married women – who usually live with their partners – while Fuchs et al.,[10] as well as our study, evaluated women in various states of relationship, including those who did not live with their partners.

We observed in our study that women with less symptoms of pelvic floor discomfort had better genital self-image, regardless of whether they were sexually active or not. Likewise, the study by Handelzalts et al.,[19] carried out with 69 women who had pelvic floor dysfunctions, showed a negative correlation between the symptoms reported in PFDI and genital self-image, reflecting the decline that pelvic floor dysfunctions can cause in this variable.

Although not investigated in the survey, the way in which the pandemic affected access to healthcare may be reflected in the data obtained. Amidst the health crisis, non-emergency health care services were affected by virus containment strategies and many women had their treatment interrupted or even had the opportunity to access urogynecological services. To fill this gap, some health professionals invested in the teleservice model, a strategy of remote care via online that allowed the follow-up of health care in a safer way, following the rules in accordance with the legislation of each region of the country. This telephysiotherapy model was an important tool for physiotherapists working with urogynecology, as it allowed the maintenance of treatments already in progress and the proper orientation of patients who sought the service during the pandemic.[34]

Regarding the pelvic floor, considering the domains of sexual function that are directly linked to the functions of this musculature - such as pain, orgasm, lubrication and satisfaction - it is important to remember that pelvic and sexual dysfunctions have an important muscle component. Franco et al.,[35] analysing 113 postmenopausal women, observed that those with sexual dysfunctions had weaker pelvic floor muscles. From this point on - and considering the already discussed pandemic scenario - we suggest that further research should be carried out and/or updated to investigate the correlation between pelvic floor disorders, including types of UI, and sexual function in relation to the strength of the pelvic muscles. The comparison of these variables with the pre-pandemic period can provide important data to guide the management of current pelvic dysfunctions, in addition to helping to understand the health-disease process in this new configuration of study and work that the pandemic provided.

A possible limitation of our study was the home situation of the volunteers, since it was not investigated whether or not they were living with their partners. The COVID-19 pandemic and measures of social distance may have influenced the number of women with a partner and who are sexually inactive (n = 10). Data from the pre-pandemic period also represent a limitation, as they were not considered in this study. Another limitation is due to environmental factors and specific cultural differences in our sample, especially in a unique pandemic scenario, which impairs its external comparison and validation for other regions and countries.

Conclusion

Our study found that a positive genital self-image was associated with better sexual function and fewer symptoms of pelvic floor discomfort in young female university students. Except in the desire domain, in all other domains of sexual function, women without sexual dysfunction had a better genital self-image. In addition, sexually active women have better genital self-image than sexually inactive ones. Further researches are needed to verify these factors in the general female population.

Authors' contributions

PS: conceptualization, formal analysis, investigation, methodology, writing (original draft). ASP: formal analysis, methodology, writing (review and editing). MMB: conceptualization, formal analysis, methodology, writing (review and editing).

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Prevalence of urinary incontinence subtypes in women

Prevalência dos subtipos de incontinência urinária em mulheres

Auristela Duarte de Lima Moser*
Nisangela do Vale Nogueira
Bruna Isadora Thomé
Luana Pereira Paz

Pontifícia Universidade Católica do Paraná (PUCPR), Curitiba, PR, Brazil

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*** Correspondence:** auristela.lima@pucpr.br

Abstract

Introduction: Urinary incontinence (UI) is present in the lives of a considerable number of women worldwide. This condition and its associated factors have been sufficiently investigated in recent years, however, prevalence estimates are still not fully clarified, as UI is seen as stigmatizing in a cultural context, and the search for treatment is not always considered by affected individuals. So, this dysfunction and its subtypes must be better understood so that it is possible to alleviate its consequences. **Objective:** To identify the prevalence of urinary incontinence subtypes, in women from a reference clinic in a public hospital in Curitiba, PR, Brazil. **Methods:** This was an observational and analytical study, with 227 women affected by UI, evaluated by means of a questionnaire including sociodemographic and general health information, in addition to defining the UI subtype. The SPSS version 25 was used for statistical analysis. **Results:** The patients presented a mean age of 60.33 ± 12.26 years. Mixed UI was the prevalent subtype (87.2%; n = 198), followed by stress (7.5%; n = 17), and urge (5.3%; n = 12). Among women with mixed UI, 60.6% had only completed elementary school, 59.1% were housewives, and 87.6% had experienced two or more pregnancies. **Conclusion:** Outlining UI subtypes, and the general and obstetric characteristics of the studied population enables the development of coping strategies for this condition, ranging from planning, diagnosis and treatment, to costs and public health management.

Keywords: Pelvic floor. Stress urinary incontinence. Urge urinary incontinence. Urinary incontinence. Women's health.

Resumo

Introdução: *A incontinência urinária (IU) está presente na vida de considerável número de mulheres no mundo. Essa condição e fatores associados a ela vêm sendo suficientemente investigados nos últimos anos, no entanto, as estimativas de prevalência ainda não são totalmente esclarecidas visto que a IU é vista como estigmatizante em âmbito cultural e a procura por tratamento nem sempre é considerada por indivíduos acometidos. Torna-se importante, portanto, esclarecer cada vez mais essa disfunção e seus subtipos para que seja possível amenizar suas consequências.* ***Objetivo:*** *Identificar a prevalência dos subtipos de IU em mulheres de um ambulatório de referência em um hospital público de Curitiba, PR.* ***Métodos:*** *Estudo observacional e analítico com 227 mulheres com IU, avaliadas por meio de um questionário para coleta de informações sociodemográficas e de saúde geral, além da definição do subtipo de IU. Utilizou-se o pacote estatístico SPSS versão 25 para a análise estatística.* ***Resultados:*** *A idade média da amostra foi de 60,33 ± 12,26 anos. IU mista foi o subtipo mais prevalente (87,2%; n = 198), seguida por esforço (7,5%; n = 17) e urgência (5,3%; n = 12). Das mulheres com IU mista, 60,6% tinham apenas o ensino fundamental, 59,1% eram donas de casa e 89,4% passaram por duas ou mais gestações.* ***Conclusão:*** *Delinear os subtipos de IU e as características gerais e obstétricas da população estudada permite que sejam elaboradas estratégias de enfrentamento desta condição, que vão desde planejamento envolvendo diagnóstico e tratamento até custos e gestão de saúde pública.*

Palavras-chave: *Assoalho pélvico. Incontinência urinária de esforço. Incontinência urinária de urgência. Incontinência urinária. Saúde da mulher.*

Introduction

Global life expectancy is growing every day, and urinary incontinence (UI) is a condition with high prevalence and considerable social impact, presenting negative repercussions in the most varied contexts of women's lives.[1,2]

The International Continence Society (ICS) defines UI as the complaint of any volume of urine lost involuntarily, constituting a social and/or hygienic problem that can be objectively demonstrated.[2,3] This condition is classified according to associated symptoms, and the most frequent types in women are: stress urinary incontinence (SUI), when the loss of urine happens after physical exertion such as coughing, sneezing, or other activities; urge urinary incontinence (UUI), when the loss occurs before or during urinary urgency; and mixed urinary incontinence (MUI), when both SUI and UUI are present.[4,5]

Treatment of UI results in substantial costs to health care systems. With more reliable estimates, it is possible to envision an annual cost of approximately $11 billion in the United States,[6] representing between $50-1000 per person.[7]

The Brazilian public health system faces chronic funding problems, and in 2018 R$1.92 billion was spent on UTI treatment, with a projection of R$3.87 billion for 2023.[8] These costs generate the need to seek low-cost, low-risk, and proven effective forms of assessment and treatment, to make them accessible to patients in the public health network.[4]

Since UI has physical and emotional consequences in women's lives, it is considered important to identify the subtype of incontinence, for possible contribution to the determination of treatment, support for public management of women's health care services, and for what is currently found in incontinence issues.

Methods

This was observational and analytical research, approved by the Ethics Committee of the C-HC/UFPR, under number 3.575.829. Data were collected at the urinary dysfunction, incontinence/nursing outpatient clinics, and at the pelvic floor interdisciplinary group of the Hospital de Clínicas of the Universidade Federal do Paraná (UFPR).

The inclusion criteria were: women aged 18 years or older, treated in one of the three clinics mentioned above, and who had UI symptoms. The participants were randomly recruited from the list previously organized by the clinic for the day's scheduled appointments, verifying the presence of UI complaints. The exclusion criteria were: presence of anatomical alterations, and/or neurological dysfunctions that could lead to UI.

The participant was approached during one of two periods: before or after her appointment on her scheduled day at the outpatient clinic. These procedures were designed to respect the routine already established for the institution's outpatient

clinics, without any interference. The objective of the first contact with the participant was to clarify all the points referring to the research. The participants signed the Terms of Free and Informed Consent Form.

Data collection comprised an individual interview using a sociodemographic and general health questionnaire (GHQ) developed by the research group. Aiming at characterizing the sample, the questionnaire was composed of specific questions about the characteristics of UI, which was subdivided into SUI, UUI, and MUI, by means of a selection of sentences separately representing stress and urgency symptoms. The UI was classified according to the characteristics identified by the participant; mixed was identified when stress and urgency symptoms were found together. The questions were developed by compiling validated instruments, such as the International Consultation on Incontinence Questionnaire - Short Form (ICIQ-SF), and with symptoms that identify the most common types of UI, as described by the International Continence Society (ICS).

Data were analyzed using the SPSS statistical package, version 25. The results of categorical variables were described as absolute and relative frequencies, and those of quantitative variables were described by means and standard deviations.

Results

The sample included 227 women with a mean age of 60.33 ± 12.26 years. The most frequent UI subtype was mixed, with 87.2%, followed by SUI (7.5%) and UI (5.3%), as described in Table 1.

Table 1 - Distribution of the sample (n = 227) according to the subtypes of urinary incontinence (UI) and age group

Type of UI	n (%)	Age (± SD)
Stress UI	17 (7.5)	63.29 (10.36)
Urge UI	12 (5.3)	60.33 (14.46)
Mixed UI	198 (87.2)	60.07 (12.30)

The level of education was predominantly elementary or high school education across all groups. Regarding occupation, most women in the group with MUI were housewives (59.1%), while 38.9% had a paid activity (Table 2).

Table 2 - Sociodemographic characteristics of the population according to the subtype of urinary incontinence (UI)

Variables	**SUI** (n = 17)	**UUI** (n = 12)	**MUI** (n = 198)
	n (%)	n (%)	n (%)
Education			
Illiterate	---	1 (8.3)	9 (4.5)
Elementary school	9 (52.9)	6 (50.0)	120 (60.6)
High school	8 (47.1)	3 (25.0)	54 (27.3)
Higher education	---	2 (16.7)	15 (7.6)
Occupation			
Housewives	12 (70.6)	9 (75.0)	117 (59.1)
Retired	---	1 (8.3)	4 (2.0)
Paid activity	5 (29.4)	2 (16.7)	77 (38.9)

Note: SUI = stress UI; UUI = urge UI; MUI = mixed UI.

Table 3 shows the data concerning the gestational history of the study participants.

Table 3 - Gestational history of the study population distributed among the subtypes of urinary incontinence (UI)

Variables	**SUI** (n = 17)	**UUI** (n = 12)	**MUI** (n = 198)
	n (%)	n (%)	n (%)
Pregnancies			
None	---	1 (12.5)	7 (87.5)
One	2 (11.8)	1 (5.9)	14 (82.4)
Two or more	15 (7.4)	10 (5.0)	177 (87.6)
Vaginal delivery			
None	1 (2.6)	1 (2.6)	37 (94.9)
One	2 (7.7)	3 (11.5)	21 (80.8)
Two or more	14 (8.6)	8 (4.9)	140 (86.4)
Cesarean delivery			
None	10 (8.2)	8 (6.6)	104 (85.2)
One	6 (8.3)	3 (4.2)	63 (87.5)
Two or more	1 (3.0)	1 (3.0)	31 (93.9)
Abortions			
None	11 (8.3)	5 (3.8)	116 (87.9)
One	5 (7.4)	4 (6.0)	58 (86.6)
Two or more	1 (3.6)	3 (10.7)	24 (85.7)
Episiotomy			
No	5 (6.2)	4 (4.9)	72 (88.9)
Yes	12 (8.2)	8 (5.5)	126 (86.3)

Note: SUI = stress UI; UUI = urge UI; MUI = mixed UI.

Most participants had been pregnant at least once, although the group with MUI showed a higher frequency (87.6%) for two or more pregnancies. A significant number of women with MUI (86.4%) had two or more vaginal deliveries, and most women with MUI (85.2%) did not undergo cesarean sections. Regarding episiotomy, 86.3% underwent this procedure.

Discussion

The participants presented a mean age of 60.33 ± 12.26 years, an age range that corroborates data found in the literature.[9-11] The most common UI subtype found in this population, MUI (87.2), is consistent with the findings of Faria et al.[9] and Saboia et al.,[7] which similarly found 72.9% and 62.6% of MUI in their analyses, respectively, with Brazilian women cared for in a unit for investigation and treatment of UI. Knorst et al.,[4] Manonai et al.,[11] Nygaard et al.,[12] Siddiqui et al.,[13] and Türkcü e Kukulu[14] also found a prevalence of MUI in their studies, although their analyses were conducted with perspectives other than identifying the UI subtype, and a diversified population.

The characteristics related to education show a lower level of education, including elementary education and illiteracy distributed among the women in the three UI subtypes (65.1% MUI, 58.3% UI, 52.9% SUI). The findings corroborate the study conducted by Knorst et al.,[4] who found 59.7% of their sample with a similar level of education, and Sacomori et al.,[15] who found 59.7% of their sample with a similar level of education, and verified that the presence of UI in women with low education (complete/incomplete elementary school) is 1.59 times higher than in women with higher education.

The predominant occupation of these women was household care (59.1% MUI, 75% UUI, 70.6% SUI), data that are in line with the findings of Kaşıkçı et al.[16] and Manonai et al.,[11] corresponding to 98.3% and 53.8%, respectively. These characteristics involving lower educational level and informal occupation indicate that the approach by the healthcare professional needs to be appropriate, as treatment for UI often involves behavioral therapy, guidance, and care that must be followed in the course of daily activities. Its effectiveness depends on proper understanding and interpretation of information on how to deal with symptoms that are associated with this dysfunction.

Studies demonstrate that obstetric history is closely related to the development of UI, and this is widely mentioned in the literature.[16-19,3,20-23] In the present study, multiparity, evidenced by two or more pregnancies, was present in 202 of 227 incontinent women. Masenga et al.[24] found a strong association between the increase in parity and the chances of developing any type of UI. Women who had a higher number of deliveries increased their chances of developing UI by 2.74 times. Treister-Goltzman e Peleg[22] also reported in their study that women who had a higher number of deliveries and more pregnancies had more severe UI than those with a lower number of pregnancies.

Vaginal delivery was experienced by 26 (11.5%) of the participants in the study at least once, and 162 (71.4%) women had vaginal deliveries two or more times. A positive association between UI and vaginal deliveries was observed in the study of Pedersen et al.,[19] in which the risk remained around 1.5 times higher regardless of the number of vaginal deliveries. Vaginal delivery is recognized in the literature as a risk factor predisposing to UI when compared to cesarean sections.[18] MacArthur et al.[25] investigated the persistence of UI over a 12-year period after delivery and found that it persisted in approximately three quarters of the women whose delivery route was vaginal. Özdemir et al.[26] found that pelvic floor muscle strength decreased as the number of vaginal deliveries increased. A meta-analysis by Tähtinen et al.[27] showed that vaginal delivery doubled the probability of SUI occurrence, as well as increasing risk of UI by approximately 3%.

Surgical delivery, or cesarean section, was performed once in 72 women and two or more times in 33 study participants; 46.3% of all incontinent women experienced this type of delivery. Comparative data can be found in the literature mentioning that this method of delivery is less harmful to the pelvic floor muscles, preserving their strength, as it does not cause perineal trauma, and thereby reduces the impact on development of UI.[5,28,29]

In this study, 41.9% of the participants had undergone abortion, and 12.3% of them had two or more experiences. A literature review performed by Seshan et al.[20] pointed out that the number of abortions is considered a risk factor for UI. Kaşıkçı et al.[16] also found a statistically significant correlation between the number of abortions and the prevalence of UI.

The literature describes improperly or not carefully performed episiotomy as a cause of perineal trauma,

which can compromise pelvic floor muscle strength and predispose to UI. However, it also mentioned that this is a modifiable factor when delivery is properly conducted, to prevent or minimize obstetric complications and long-term sequelae.[3,5,17,30] A high rate of this procedure was found in this study, with 146 women reporting episiotomies, which is in line with the study by Silva et al.,[3] in which 80% of incontinent women experienced this procedure. Ardila found that 213 of the 289 women analyzed underwent episiotomy, and found that episiotomy increased by 1.78 times the probability of developing SUI.[17]

The pelvic floor suffers too much stress in several situations during a woman's life. With each pregnancy, the physiology and biomechanics of the female organism is altered. In addition, weight gain as the fetus grows and vaginal delivery can also bring consequences and future sequelae, due to trauma and perineal lesions. It is important to remember, however, that a well-conducted and appropriate natural birth is beneficial for both mother and baby. As the years go by, natural aging, the climacteric period, and accumulated injuries in the pelvic region may aggravate the existence of UI or predispose one to it. UI is a dysfunction of multifactorial cause, which involves losses that range from the execution of daily life activities to the decline of the general physical condition. It causes considerable reduction in quality of life, therefore its approach and diagnosis are associated with several factors that must be widely investigated and detailed for the treatment proposal to be assertive, and the costs and possible aggravations minimized.

Conclusion

Mixed urinary incontinence was the prevalent subtype, appearing in 87.2% of the participants. Factors such as increased age, higher number of pregnancies, vaginal delivery, and episiotomy were also found to be relevant within the population that presented MUI. This profile could support some actions, such as:

a. Mandatory inclusion of UI occurrence records in healthcare appointments, particularly in the women's health area, so that the occurrence of UI can be monitored, regardless of the complaint reported.

b. Development of prevention strategies, such as orientation booklets or self-care manuals, for prevention and management of UI, considering the social indicators of these women (education, age group, occupation, daily routine, knowledge about UI and its implications, among other factors).

Therefore, considering the high prevalence of UI found, studies that address the topic in more vulnerable populations are recommended for a more comprehensive understanding of UI. Moreover, it is important to identify the subtypes of UI, providing new possibilities in the areas of health education, planning, and intervention for this condition, which proves to be a phenomenon that affects women of different age groups and that evolves chronically, contributing to a significant decrease in women's health.

Authors' contribution

NVN and BIT participated in data collection and adjustment of the article to the journal's standards. LPP was responsible for statistical review. ADLM participated in the design of the topic, supervision of data collection, and review of the final manuscript.

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Probable sarcopenia and obesity in women with urinary incontinence in the climacteric period

Provável sarcopenia e obesidade em mulheres com incontinência urinária no climatério

Roberta Luana da Conceição de Araújo Silva
Sara Vasconcelos de Oliveira Pinto
Simony Lira do Nascimento
Mayle Andrade Moreira*

Universidade Federal do Ceará (UFC), Fortaleza, CE, Brazil

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*** Correspondence:** mayleandrade@gmail.com

Abstract

Introduction: Sarcopenia and obesity are associated with several health conditions. Few studies, however, have analyzed the presence of these conditions in climacteric women with incontinence, and the association between these conditions and the severity of urinary incontinence (UI) is not clear. **Objective:** To analyze probable sarcopenia, sarcopenia, and obesity in climacteric women with different UI severities, and the association between sarcopenia and UI severity. **Methods:** This was a cross-sectional study in a public maternity hospital in Northeast Brazil, with women aged ≥ 40 years. Sociodemographic issues, urogynecological history, UI severity (Incontinence Severity Index - ISI), grip strength, and anthropometric measures (waist circumference and body mass index - BMI) were evaluated. Means, standard deviations, absolute and relative frequencies, T test, and Fisher exact test were used (significance at 5%). **Results:** The sample comprised 177 women, with a mean age of 56.3 (± 9.7) years. Regarding UI, 69 (39.0%) women presented mixed UI, and 53.1% presented moderate UI severity. Only 18.1% women had normal BMIs, and 46.8% had general obesity and 80.3% had abdominal obesity. Probable sarcopenia (low strength) was observed in 35 (20%) women, and sarcopenia, in 3.4%. Women with severe/very severe UI presented lower grip strengths ($p = 0.02$) and higher BMIs ($p = 0.04$). Sarcopenia was associated with greater UI severity ($p = 0.005$). **Conclusion:** Probable sarcopenia and higher BMI were observed in women with greater UI severities, and sarcopenia was associated with greater UI severity. Preventive measures are needed in such conditions to avoid future complications.

Keywords: Climacteric. Obesity. Sarcopenia. Urinary incontinence. Women.

Resumo

Introdução: *Sarcopenia e obesidade têm relação com diversas condições de saúde. Poucos estudos, entretanto, têm analisado a presença destas condições em mulheres incontinentes no climatério, e não está claro se existe associação destas com a gravidade da incontinência urinária (IU).* ***Objetivo:*** *Analisar provável sarcopenia, sarcopenia e obesidade em mulheres com diferentes gravidades de IU na fase do climatério e a associação da sarcopenia com a gravidade da IU.* ***Métodos:*** *Estudo transversal realizado em maternidade pública do nordeste do Brasil, em mulheres com IU a partir de 40 anos. Foram avaliadas questões sociodemográficas, histórico uroginecológico, gravidade da IU (*Incontinence Severity Index - *ISI), força de preensão e medidas antropométricas (circunferência abdominal e índice de massa corporal - IMC). Foram analisadas médias e desvios-padrão, frequências absolutas e relativas, teste T e exato de Fisher (significância de 5%).* ***Resultados:*** *Amostra de 177 mulheres com média de 56,3 (± 9,7) anos. Sobre a IU, 69 (39,0%) mulheres apresentavam IU mista e 53,1% gravidade moderada. Apenas 18,1% apresentavam IMC normal, 46,8% obesidade geral e 80,3% obesidade abdominal. Provável sarcopenia (baixa força) foi observada em 35 (20%) mulheres e sarcopenia em 3,4%. Mulheres com IU grave ou muito grave apresentaram menor força de preensão (p = 0,02) e maior IMC (p = 0,04). A sarcopenia foi associada à maior gravidade de IU (p = 0,005).* ***Conclusão:*** *Observou-se provável sarcopenia e maior IMC em mulheres com maior gravidade de IU e associação da sarcopenia com a maior gravidade de IU. São necessárias medidas preventivas quanto a tais condições, evitando futuras complicações.*

Palavras-chave: *Climatério. Obesidade. Sarcopenia. Incontinência urinária. Mulher.*

Introduction

The physiological aging process is accompanied by several changes, including changes in body composition.[1] In the female aging process, the climacteric period corresponds to the physiological transition process from the reproductive phase to the non-reproductive phase of a woman's life.[2] In this period, the deficiency in estrogen levels due to menopause, can accelerate the effect of aging on tissues, including muscle, which can have consequences on the function of the pelvic floor muscles.[3]

Loss of muscle strength, when associated with loss of muscle mass, results in a condition called sarcopenia.[4] The European Working Group on Sarcopenia in Older People (EWGSOP) recognizes this condition as a progressive and generalized muscle disease, which can present in a severe form when also associated with a loss of physical performance.[5]

Currently, muscle strength predicts adverse outcomes more accurately and is considered the most reliable measure of muscle function. Thus, the EWGSOP, in its new definition, considers probable sarcopenia when low muscle strength is detected, using this measurement as the main parameter of sarcopenia.[5]

Sarcopenia can cause serious health effects, including changes in mobility and risk of falls and fractures, which can lead to activity limitations, functional disability, impairment in the quality of life, and mortality.[5,6] Despite being associated with aging, sarcopenia can develop from the fourth decade of life.[5] The loss of muscle mass is 20% greater in women than that in men, and in the female population, this loss is significantly greater from the fifth decade of life as compared to that in the fourth decade.[7]

In addition, during the menopausal transition period, women have a greater tendency to gain weight, which is associated with increases in the body mass index (BMI) and waist circumference.[8] The abnormal or excessive accumulation of fat is defined by the World Health Organization (WHO) as obesity, which is considered a global health problem due to the increase in its prevalence in recent decades and its association with multiple comorbidities.[9]

Obesity accelerates the aging process, which can lead to changes in muscle phenotype, quantity, and quality.[10] Thus, contractile performance and force production may change, compromising skeletal muscle function,[10] in addition to resulting in increased intra-abdominal pressure, urethral and vascular structural damage in the pelvic floor, and consequently, muscle dysfunction.[11]

Changes in body composition, such as sarcopenia and obesity, seems to be associated with numerous health conditions.[6,10] Among these, urinary incontinence (UI) is one of the most prevalent conditions in middle-aged and older women. UI can negatively affect quality of life, leading to physical, functional, and psychological limitations in the affected population.[12]

The International Continence Society (ICS) defines UI as any complaint of involuntary loss of urine,[13]

and classifies it into three main types: stress urinary incontinence (SUI), urge incontinence (UUI), and mixed (MUI).[14] Estimates indicate that more than 200 million people worldwide are affected by this health condition.[15] Among middle-aged and post-menopausal woman, the prevalence range is 44% to 57%.[12]

Musculoskeletal conditions were found to be associated with UI complaints, and UI is associated with advanced age, high BMI, lower strength, and lower gait speed in older women.[16] However, although there are studies that address UI in Brazil, few have analyzed the presence of sarcopenia and obesity in women with incontinence in the climacteric phase, and no studies have analyzed possible associations with the severity of UI.

Considering that UI can develop due to the decrease in strength of the pelvic floor muscles and the overload imposed on these muscles; given the high prevalence of this condition in women, especially middle-aged and older women; and, knowing its impact on quality of life and functionality of these women, the objectives of this study were to analyze probable sarcopenia, sarcopenia, and obesity in women in the climacteric phase with UI of different severities and, secondarily, to analyze the association of sarcopenia with the severity of UI.

Methods

Type and place of study

This cross-sectional study was carried out in the physiotherapy service of the urogynecology outpatient clinic of the Maternity School Assis Chateaubriand (MEAC), a public maternity hospital in Ceará, Northeastern Brazil. The MEAC is a reference maternity hospital for the whole of Ceará, and the physiotherapy service of the urogynecology outpatient clinic is one of the few in the state that offers free and specialized care for women with UI.

Subjects and sample selection

This study employed a non-probabilistic sample, for convenience. Participants were recruited consecutively when they arrived for physical therapy evaluation at the MEAC urogynecology outpatient clinic. Women evaluated from July 2017 to July 2019 who met the inclusion criteria were considered for this study.

Inclusion and exclusion criteria

To participate in the study, the women needed to have entered the outpatient physiotherapy service in the cited period and be over 40 years old and diagnosed with UI. In addition, they could not have neurological and/or degenerative diseases, such as Parkinson's, stroke, fracture in the dominant upper limb or any other condition that compromised the measurement of grip strength and completion of the questionnaires, as identified by the researchers in the first contact or were self-reported by the participant. The abandonment or impossibility, of any nature, while performing any of the procedures of the research protocol were considered as exclusion criteria.

Data collection and instruments used

Prior to data collection, the interviewers were trained and their performance of the procedures were supervised. The research project was submitted to the MEAC Research Ethics Committee (CAAE: 69965617.0.0000.5050), and data collection was initiated after approval was received. Women were included consecutively as they entered the urogynecological physiotherapy service at the maternity hospital.

In the first contact, protocols and research objectives were clarified, after which they were asked to sign the Free and Informed Consent Term (FICT). After consent, information was collected through a structured questionnaire, assessment of anthropometric measurements, grip strength test, and UI severity questionnaire. All the variables are described hereafter.

Socioeconomic and demographic variables

As for marital status, women were categorized as "with partnership" and "without partnership." In relation to ethnicity/race, they were classified as white, brown, and black. Regarding education, they were classified as illiterate, completed elementary school, completed high school, and higher education or more. Women were categorized into two groups on the basis of whether they were engaged performing income-generating activities.

Urogynecological and obstetric history

Variables including type of UI and number of pregnancies and deliveries were considered. Regarding

the types of UI, women were categorized into SUI, UUI, and MUI. Number of pregnancies was also considered for analysis.

Regarding menopausal transition, women were asked about the presence or absence of menstrual cycles, as well as the time of absence of these. Thus, they were categorized into three periods: pre-menopausal (regular menstrual cycles, which may be shorter, but without delays); peri-menopausal (change in cycle interval greater than seven days from the observation of the last menstrual cycle, up to one year of amenorrhea); and, post-menopausal (women who have had their last period more than one year ago), following the STRAW – Stages of Reproductive Aging Workshop classification.[17]

Severity of urinary incontinence

UI severity was evaluated using the Incontinence Severity Index (ISI) questionnaire. The ISI is a brief, validated instrument that facilitates the assessment and classification of UI severity.[18] Furthermore, it has good reliability (Cronbach's α coefficient = 0.93 and intra-class correlation coefficient = 0.96) and satisfactory construct validity ($r = 0.72$, $p < 0.01$).[18] Composed of two questions, frequency and amount of urinary leakage, the final score is obtained by multiplying the frequency scores by the amount of urinary leakage, allowing its classification into mild, moderate, severe, and very severe.[18] For the analysis of the present study, severity was categorized as mild to moderate and severe or very severe.

Physical exercises

Regarding the performance of physical exercise, the women were asked about the performance, type of activity, and frequency and duration per week. In the present study, women were considered to be physically active when they regularly exercised for at least 150 minutes/week.[19]

Anthropometric measurements - Classification of general and abdominal obesity

A digital scale (Líder® brand, model P-150 C) and a stadiometer were used to measure weight (kg) and height (m), respectively, which were later used to calculate the BMI (kg/m^2). The BMI values were classified into the following categories according to the International Classification of general obesity of the WHO: 18.50 to 24.99 (normal weight); 25.00 to 29.99 (overweight); 30.00 to 34.99 (obese I); and, ≥ 35.00 (obese II and III).[20]

For the measurement of waist circumference, a tape measure "Fiberglass" was used with divisions of 1 mm and the measurement followed the procedures suggested by the document *Waist circumference and waist-hip ratio: report of a WHO expert consultation*.[21] The participant was positioned with feet together and arms over the trunk and was instructed to relax. The measurement was taken above the iliac crests and below the ribs, at the end of a normal expiration. Women with waist circumferences ≥ 88 cm were considered to have abdominal obesity, as proposed by the Brazilian obesity guidelines defined by the Brazilian Association for the Study of Obesity and Metabolic Syndrome.[22]

Waist circumference can provide an estimate of increased abdominal fat, even in the absence of a change in BMI, thereby avoiding some classifications errors.[1] These errors can occur because the BMI does not differentiate between lean mass and fat mass, and even persons with BMI classified as normal can have high percentages of fat mass.[1]

Grip strength

To assess handgrip strength, a calibrated SAEHAN® - SH 5001 hydraulic dynamometer was used, which provided a record of muscle strength in kilograms-force (kgf). The measurement was performed as recommended by the American Society of Hand Therapists,[23] with the volunteer in a sitting position, with the shoulder adducted and in neutral rotation, elbow positioned at 90° of flexion, and the forearm and wrist in neutral positions.

In this position, after demonstration by the evaluator, maximum contractions were requested to be sustained for five seconds, with an interval of one minute between measurements. The dominant limb was considered for the evaluation. The arithmetic mean of the three consecutive measurements was considered for the analysis.[23] Women were classified as having low grip strength (probable sarcopenia) when they presented values below the 20th percentile (≤ 13.0 kgf) of the sample.[4]

Skeletal muscle mass (SMM)

Muscle mass prediction was obtained from the (SMM) prediction equation proposed by Lee et al.[24] (in a sample of adults between 20 and 81 years old), which had as reference the magnetic resonance and the following final equation: SMM (kg) = (0.244 * MC) + (7.8 * EST) + (6.6 * sex) – (0.098 * age) + (ethnicity – 3.3), where EST = height (m); MC = body mass (kg); sex: 1 = men and 0 = women; ethnicity: 1.2 = Asians; 1.4 = Afro-descendants, blacks and browns; 0 = Caucasian, white.[24]

This equation was validated in Brazil and, according to Rech et al.,[25] the estimated SMM did not differ statistically from that obtained by DEXA (Dual-Energy X-ray Absorptiometry) and showed a high correlation, both in men ($r = 0.90$; $p < 0.05$) and women ($r = 0.86$; $p < 0.05$). In addition, agreement was observed between the methods (Kappa = 0.743; $p < 0.001$), with high sensitivity (86%) and specificity (89%), demonstrating that there was no difference between the prevalence values of sarcopenia measured by DEXA and the equation of Lee et al.[24,25]

After the value was obtained by the SMM prediction equation, the skeletal muscle mass index (SMI) was calculated, considering that SMI = SMM [skeletal muscle mass (kg)/height (m)²]. Women were classified as having low muscle mass when they presented SMI values below the 20th percentile (≤ 7.88 kg/m²) of the studied sample.[4]

Classification of probable sarcopenia and sarcopenia

According to the new European sarcopenia consensus established by the EWGSOP, sarcopenia is likely when low muscle strength is detected, and the association with low muscle mass confirms the diagnosis. Sarcopenia is considered severe when it is associated with low muscle strength, muscle mass, and physical perfomance.[5] In this study, the presence of probable sarcopenia was considered when the women had reduced grip strengths, (≤ 13 kgf) and sarcopenia was considered in the presence of reduced grip strength (≤ 13 kgf) associated with low muscle mass as assessed by the SMI (≤ 7.88 kg/m²).[5]

Data analysis

For statistical analysis, SPSS software, version 20.0 (SPSS, Chicago, IL, USA) was used. Data normality was verified using the Shapiro–Wilk test. The descriptive analysis of the sample was presented using means and standard deviations for quantitative variables and absolute and relative frequencies for categorical variables.

Student T test was used to compare body composition and grip strength variables between the UI severity groups. Finally, for the analysis of the association between the independent categorical variables (sarcopenia and obesity) and the dependent variable (UI severity), Fisher exact test was used. For all tests, a statistical significance level of 5% was considered.

Results

The sample comprised 177 women. Regarding sociodemographic data, it was observed that the mean age of the women was 56.31 (± 9.75) years. By age group, 61.6% were < 60 years old. As for education, 50.3% had completed elementary school, and only 9.1% had received higher education or more. Most women reported partnership (n = 100; 56.5%). Only 68 (38.4%) reported engaging in income-generating activities. As for the number of pregnancies and deliveries, averages of 3.77 (± 2.92) and 3.06 (± 2.42) were observed, respectively.

Notably, only 32 (18.1%) women had normal BMIs, and 83 (46.8%) were classified within the obesity categories. The mean BMI was 30.07 (± 5.42). The mean waist circumference was 96.83 (± 12.26), and 80.3% had abdominal obesity. Other variables and categories are described in Table 1.

Regarding the type of UI, 39% of the women had MUI. Regarding the severity of UI, 4% were classified as mild; 53.1%, moderate; 27.7%, severe; and 15.2%, very severe. This variable was recategorized into two groups for association analysis (mild to moderate and severe to very severe). These values and the other types of urinary incontinence are described in Table 2.

The mean grip strength among the women evaluated was 18.08 (± 5.61) kgf. Table 3 shows the MME and IMME means, as well as the number of women with low muscle mass, low muscle strength (probable sarcopenia), and low mass plus low muscle strength (sarcopenia: 3.4%).

On comparing the values of grip strength and body composition variables between the different groups of UI severity, statistically significant differences were

observed for grip strength (p = 0.02) and BMI (p = 0.04). Women with severe or very severe UI had lower mean grip strengths and higher mean BMIs (Table 4).

Secondarily, on analyzing the association of sarcopenia with UI severity (ISI), a significant statistical difference (p = 0.005) was observed, showing that sarcopenia (deficit in muscle strength and mass) was present in women with severe or very severe UI (Table 5).

Table 1 - Sample characteristics (n = 177)

Variables	n	%
Age group		
< 60 years	109	61.6
> 60 years	68	38.4
Color		
White	37	21.0
Brown	124	70.5
Black	5	8.5
Education*		
Illiterate	7	4.0
Up to complete elementary school	88	50.3
Up to high school	64	36.6
Higher education or more	16	9.1
Partnership		
With partner	100	56.5
Without partner	77	43.5
Income-generating activities		
Yes	68	38.5
No	109	61.6
Menopausal Status		
Pre-menopause	32	18.1
Perimenopause	26	14.7
Post-menopause	119	67.2
Regular exercise*		
Yes	16	21.3
No	59	78.7
Body mass index (kg/m²)		
Normal weight	32	18.1
Overweight	62	35.0
Obese I	50	28.2
Obese II & III	33	18.6
Abdominal circumference (cm)		
≥ 88 cm	139	80.3
< 88 cm	34	19.7

Note: *n valid = schooling (n = 175) and regular exercise (n = 75).

Table 2 - Type and severity of urinary incontinence (UI) according to the ISI questionnaire

Variables	n (177)	%
Type of IU		
UUI (urgent)	46	26.0
SUI (stress)	62	35.0
MUI (mixed)	69	39.0
ISI classification		
Mild to moderate	101	57.1
Severe to very severe	76	42.9

Note: ISI = Incontinence Severity Index.

Table 3 - Skeletal muscle mass (SMM), skeletal muscle mass index (SMI), grip strength, and sarcopenia in women with urinary incontinence

Variables	Average	SD
SMM (kg)	21.53	3.50
SMI (kg/m²)	9.14	1.37
Grip strength (kgf)	18.08	5.61
SMI (kg/m²)*	n	%
Below the 20th percentile	36	20.5
Above the 20th percentile	140	79.5
Probable sarcopenia (kgf)*	n	%
Force below the 20th percentile	35	20.0
Force above the 20th percentile	140	80.0
Sarcopenia*	n	%
Yes	6	3.4
No	168	96.4

Note: SD = standard deviation. *n valid = SMI (n = 176), probable sarcopenia (n = 175), and sarcopenia (n = 174).

Discussion

The main objective of this study was to verify probable sarcopenia, sarcopenia, and obesity, and the existence of an association between sarcopenia and the severity of UI in women with UI in the climacteric phase. Women with severe or very severe UI had lower mean grip strengths (probable sarcopenia) and higher mean BMIs. There were also high frequencies of general and abdominal obesity, as well as an association of sarcopenia (deficit in strength and muscle mass) with a greater severity of UI.

Table 4 - Comparison of grip strength, SMM, SMI, waist circumference, and BMI between different UI severity groups

Variables	ISI classification	n	Average	SD	p-value [a]
Grip strength	Mild to moderate	101	18.91	6.08	0.02
	Severe or very severe	74	16.95	4.72	
SMM	Mild to moderate	100	21.38	3.55	0.49
	Severe or very severe	76	21.74	3.43	
SMI	Mild to moderate	100	9.03	1.31	0.26
	Severe or very severe	76	9.27	1.44	
Waist circumference	Mild to moderate	99	95.34	11.53	0.06
	Severe or very severe	74	98.83	12.99	
BMI	Mild to moderate	101	29.38	4.99	0.04
	Severe or very severe	76	31.00	5.84	

Note: SMM = skeletal muscle mass; SMI = skeletal muscle mass index; BMI = body mass index; UI = urinary incontinence; ISI = Incontinence Severity Index questionnaire. [a]Student t test.

Table 5 - Analysis of the association between sarcopenia and severity of urinary incontinence

Sarcopenia	ISI classification		Total (n = 174)	p-value[a]
	Mild to moderate n (%)	**Severe or very severe** n (%)		
Yes	0 (0)	6 (100)	6 (100)	0.005
No	100 (59.5)	68 (40.5)	168 (100)	

Note: ISI = Incontinence Severity Index questionnaire. [a]Fisher exact test.

Low grip strength, considered as probable sarcopenia, is associated with several health problems, such as falls, fractures, increased functional limitations, and poor quality of life.[5] Grip strength is a simple and inexpensive non-invasive marker of muscle strength, considered a key component in the diagnosis of sarcopenia.[5]

In the present study, 35 women had low muscle strength, that is, probable sarcopenia. When the grip strength values were compared between the different groups of UI severity, a statistically significant difference was observed (p = 0.02). The average grip strength was 18.0 kgf. A study proposed reference values of handgrip strength for individuals aged 18–85 years and considering an average of 25.1 kgf in the dominant limb for women aged 55–59 years.[26] The consensus on sarcopenia has a cut-off point of 16 kgf.[5]

Compared with the sample of the present study, a low average value of grip strength was observed in women with an average of 56 years. Therefore, these data serve as a warning for the adoption of preventive measures in order to prevent sarcopenia in the future, in addition to other complications associated with strength deficit. Preventive measures such as adequate nutrition and regular exercise seem to delay or reverse sarcopenia.[5]

Further, sarcopenia was found in 3.4% of the sample. A similar value, i.e. < 3% was observed by Abe et al.,[27] while evaluating women under 60 years of age, similar to the present study sample. On the other hand, Simsek et al.[28] observed the presence of sarcopenia in 5.2% while evaluating 909 older people aged over 65 years, of which 582 were women.

In a systematic review, a prevalence of 1 to 29% of sarcopenia was observed in studies with a mean age ranged from 59.2 to 85.8 years; 14 to 29% in those living in long-term care institutions, and 10% in those in acute hospital care.[29] According to Cruz-Jentoft et al.,[29] the prevalence of sarcopenia varied widely in the literature, which is probably justified by the different populations and regions studied, as well as the different methods used for its assessment.

The pathophysiological mechanisms responsible for the development of sarcopenia are multiple and complex; they include physical inactivity, pathologies, physiological changes related to aging, and inadequate nutrition, among others.[4] Thus, considering that sarcopenia is a multifactorial condition, it is noteworthy that in the present study, analyses were not performed for adjusting for possible confounding factors which allow for bias in the results.

Given this context and considering that the mean age of this sample was 56.3 years, the presence of insufficient strength and muscle mass in some women should be noted. Thus, this population may evolve with limitations in its functionality over time, not only related to the structure and function of the body, but also to its activities and social participation.

Regarding general obesity, the frequency observed was 46.8% as per the obesity categories defined by BMI, whereas abdominal obesity was 82.1%. Among women with incontinence, Baykuş and Yenal[15] observed a similar obesity frequency of 47.7%, as assessed by BMI. The number of obese people is increasing worldwide; in 2016, the WHO reported that approximately 13% of adults worldwide were obese.[30] In addition, studies show that this prevalence is higher in the female population as compared to the male population.[8] The menopausal transition period may contribute to this difference, as this period is associated with increased body weight and changes in body composition, usually in the form of abdominal adiposity and decreased lean muscle mass.[8,31]

BMI is a measure often used in research and clinical settings. Waist circumference, however, becomes more relevant, as it considers the distribution of fat, and this parameter is an independent predictive factor for mortality.[8] In a study carried out in middle-aged women (mean 49.9 ± 5.5 years) in the Northeast, the authors observed abdominal obesity in 67.4% of those evaluated,[32] a proportion slightly lower than that observed in the present study (80.3%), which was performed only in women with UI. Park and Lee[11] observed that women with incontinence (mean 55.4 ± 13.3 years) had significantly higher values of BMI ($p < 001$) and waist circumference ($p < 001$) as compared to women without incontinence. These findings indicate that women with UI may have higher BMI and waist circumference values.

In the study by Park and Baek,[33] non-obese women (< 25 kg/m^2) with abdominal obesity (waist circumference ≥ 80 cm) had a higher chance of UI, followed by obese women (BMI ≥ 25 kg/m^2) with abdominal obesity, which indicates that abdominal obesity may have a greater impact on UI than general obesity.

Abdominal obesity can lead to several metabolic consequences such as dyslipidemia, hypertension, and cardiovascular disease. The cardiovascular disease is the leading cause of death in postmenopausal women.[31] Therefore, it is necessary to reflect on these values and direct attention to the control of body composition in middle-aged women, in order to take preventive measures to reduce future complications. In the present study, we observed a high frequency of obesity and a higher mean BMI in women with severe or very severe UI and a trend towards a higher mean waist circumference in these women. In this way, body weight reduction is encouraged, as it is positively related to the improvement of incontinence symptoms.[33]

Urinary incontinence is considered a relevant health problem in the world, as it can lead to physical, emotional, psychosocial, sexual, and hygienic impairment, among others, in addition to high health expenditures for the public health system.[15] In the present study, the majority of the population (39.0%) had mixed UI. Similar results were seen in the study carried out by Juliato et al.[14] with 749 middle-aged Brazilian women (mean 52.5 ± 4.4 years), where a greater percentage of MUI was observed (40.2%). Although the literature shows that the most common type is SUI, MUI is more prevalent in older women and it affects this population more severely.[34]

Regarding the severity of UI, more than 40% of the sample was classified as severe to very severe. In addition, when analyzing the association of sarcopenia with UI severity (ISI), there was a statistically significant difference ($p = 0.005$), showing that sarcopenia (deficit in muscle strength and mass) is present in women with UI severity classified as severe or very severe. There is no evidence in the literature to date about this association, although studies have observed a relationship between lower muscle strength and lower physical performance and UI.[16,35]

Some limitations of this research are recognized, such as the assessment of muscle mass through the prediction equation using anthropometric measurements, although it is validated in relation to the gold standard, i.e., magnetic resonance,[25] as well as the method of filling out the questionnaire through self-reporting; however, it is noteworthy that they are validated and widely used

questionnaires in research. Furthermore, considering that the study sample was selected by convenience, selection bias could have occurred.

A future longitudinal study is suggested, in which the cause-and-effect relationship between sarcopenia and UI severity can be analyzed, which cannot be observed in cross-sectional studies. Studies considering women with and without UI should also be conducted to analyze sarcopenia and the limitations that this condition can bring related to activities and social participation.

Finally, considering that the average age of the women was less than 60 years, there was a considerable number of women with probable sarcopenia (low muscle strength) and a higher frequency of sarcopenia compared to previous studies in the literature. In addition, there were also high percentages of women with general and abdominal obesity in this population. Thus, understanding the repercussions that sarcopenia and obesity can cause, the importance of implementing preventive strategies aiming at reducing complications related to these conditions is emphasized. It is also noteworthy that sarcopenia was associated with a greater severity of UI, reinforcing the importance of preventing and recovering from this condition, with the aim of contributing to reducing the severity of UI.

Conclusion

In this study, the presence of probable sarcopenia (low muscle strength) and sarcopenia was observed in climacteric women with UI, along with high frequencies of general and abdominal obesity. In addition, sarcopenia was associated with greater severity of UI. Thus, knowing the limitations that these conditions can cause, preventive measures that promote an increase in muscle mass and strength and reductions in body weight and waist circumference, in addition to the practice of physical exercise and adequate nutrition are required, as sarcopenia and obesity are reversible conditions. Thus, such measures can also contribute to reducing the severity of UI, thereby preventing future complications.

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Authors' contributions

RLCAS and MAM were responsible for data analysis and interpretation and, together with SLN, for writing the manuscript; SVOP and SLN reviewed the manuscript. All authors were responsible for the study design and approval of the final version.

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Behavioral therapy in the treatment of urinary incontinence: quality of life and severity

Terapia comportamental no tratamento da incontinência urinária: qualidade de vida e gravidade

Luísa María Gómez Méndez
Anna Caroline Ribeiro de Moura
Rayanne Moreira da Cunha
Vilena Barros de Figueiredo
Mayle Andrade Moreira
Simony Lira do Nascimento*

Universidade Federal do Ceará (UFC), Fortaleza, CE, Brazil

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*** Correspondence:** simonylira@ufc.br

Abstract

Introduction: Behavioral therapy (BT) is an association of techniques that aim to minimize or abolish urinary symptoms, including urinary incontinence (UI), through education about the health condition, changes in lifestyle and nutritional habits, and bladder training. **Objective:** To analyze whether there is a change in the quality of life and severity of UI after group behavioral therapy in women with UI. **Methods:** Prospective observational study conducted in a pelvic physical therapy public service. Women with UI of any etiology, over 18 years of age, who completed a protocol of four weekly group BT meetings as the first treatment option for UI were included. Outcomes (impact of UI on QoL and classification of UI severity) were assessed before, immediately after, and one month after BT using the King's Health Questionnaire (KHQ) and the Incontinence Severity Index (ISI). **Results:** Sample of 146 participants. A reduction in the impact of UI on QoL was observed in the KHQ domains: impact of UI, physical limitations, personal relationships, emotions, general health perception ($p < 0.05$) immediately after BT. After one month, there was a reduction in the UI impact domains, daily activity limitations, physical limitations, general health perception, emotions, and sleep ($p < 0.05$). In addition, there was a reduction in the classification of UI severity assessed by the ISI ($p < 0.001$). **Conclusion:** There was an improvement in QoL and a decrease in UI severity in women with UI who completed a BT group as the first treatment option.

Keywords: Behavior therapy. Physical therapy modalities. Urinary incontinence.

Resumo

Introdução: *A terapia comportamental (TC) é uma associação de técnicas que visam minimizar ou abolir sintomas urinários, incluindo a incontinência urinária (IU), por meio da educação sobre a condição de saúde, mudanças em hábitos de vida e alimentares e treinamento vesical.* ***Objetivo:*** *Analisar se existe alteração da qualidade de vida e da gravidade da IU após terapia comportamental em grupo de mulheres com IU.* ***Métodos:*** *Estudo observacional prospectivo realizado em um serviço público de fisioterapia pélvica. Mulheres com IU de qualquer etiologia e maiores de 18 anos foram submetidas a um protocolo de quatro encontros de TC em grupo, semanalmente, como primeira opção de tratamento para IU. Os desfechos, impacto da IU na qualidade de vida (QV) e classificação da gravidade da IU foram avaliados antes, imediatamente após e um mês depois da TC pelos questionários King's Health Questionnaire (KHQ) e Incontinence Severity Index (ISI).* ***Resultados:*** Amostra de 146 participantes. Observou-se redução do impacto da IU na QV nos domínios do KHQ: impacto da IU, limitações físicas, relações pessoais, emoções, percepção geral de saúde ($p < 0,05$) imediatamente após a TC. Após um mês, observou-se redução nos domínios de impacto da IU nas limitações de atividades diárias, limitações físicas, percepção geral de saúde, emoções e sono ($p < 0,05$), além da redução na classificação de gravidade da IU avaliada pelo ISI ($p < 0,001$). ***Conclusão:*** Houve melhora da QV e diminuição da gravidade da IU em mulheres com IU submetidas à TC em grupo como primeira opção de tratamento.

***Palavras-chave*:** Terapia comportamental. Fisioterapia. Incontinência urinária.

Introduction

The International Continence Society (ICS) defines urinary incontinence (UI) as any involuntary urine loss, classified into three main categories according to symptoms. Stress urinary incontinence (SUI) is involuntary urine loss during exercise, or other types of effort, such as coughing or sneezing; urge urinary incontinence (UUI) is characterized by the urgency symptom that appears simultaneously with or just before incontinence; mixed urinary incontinence (MUI) occurs when involuntary urine loss is associated with urgency and effort.[1,2]

Urinary incontinence harms people that suffer from it, impacting them psychologically, physically, socially, domestically, occupationally, and sexually. It negatively affects the quality of life (QoL) in these individuals.[3,4] In some cases, the dysfunction generates lifestyle, habitual, and daily activity changes because of the disturbing situations that it causes, which lead high levels of stress and feelings of vulnerability, that can cause social isolation.[5] Therefore, the ICS affirms that QoL evaluation should be included alongside clinical assessment.[6]

Behavioral therapy (BT) consists of an association of techniques that aim to reduce or even eliminate urinary symptoms, including UI, through education about health conditions, changes in lifestyle and nutritional habits, and also through bladder training. As an UI treatment, BT can be applied alone or associated with other conservative approaches, such as training of the pelvic region muscles, drug treatment, or even surgery.[7]

Behavioral therapy is developed based on health education, which involves the patient's perception of her own body and health condition, requiring adjustments related to habits and behaviors.[8,9] The changes include weight loss, avoiding some foods or beverages that are harmful to the bladder, regulation of intestinal function, drinking water correctly, and also a scheduled voiding regimen can reduce urinary symptoms. Usually, these instructions are individualized according to the type of UI, urinary symptoms, and each patient's life habits.[10]

Behavioral therapy is an intervention that can be easily reproduced by professionals in a multidisciplinary team who work in primary health services and have the possibility of working with a group of patients.[11] This study assumes that BT implementation as the first therapy option could improve the urinary symptoms and the QoL of women with UI, which would allow a reduction of the number of people directed to a secondary level of attention. Because of the promising BT effects, its low cost, noninvasive approach, and fewer collateral effects, this study has the objective to analyze if an alteration exists in QoL and the incontinence severity in women with UI after receiving group BT.

Methods

Type and location of the study

Observational, quantitative, and prospective study that took place at the Pelvic Physiotherapy Service of the Urogynecology Ambulatory of the Maternity Ward School Assis Chateaubriand (MEAC)/Federal University of Ceará, CE, Brazil. The data collection period was June of 2015 to August of 2018.

Subjects and sample selection

The patient's flow starts with medical referral from thae Basic Unit of Health (UBS) to a specialized clinic (Urogynecology ambulatory). At the ambulatory clinic, the women go through a medical evaluation, examinations if necessary, and then, from this evaluation, they are directed to surgery or pelvic physiotherapy.

When the women enter the pelvic physiotherapy service, they are minutely examined about their complaints and clinical symptoms, in addition to functional evaluation of the pelvic floor muscles; therefore, they have conscious control of how to contract the pelvic floor muscles correctly. After individual evaluation in pelvic physiotherapy, the women with UI are directed to start BT treatment. Those who do not have conscious control of the pelvic muscle region are immediately directed for individual treatment. During BT women do not train the pelvic floor muscles, this occurs in a later portion of their treatment.

The nonprobabilistic convenience sample of the study was composed of patients who started BT through the pelvic physiotherapy ambulatory service of MEAC between June of 2015 and August of 2018. The sample was considered according to the number of patients who entered the services consecutively, during the previously mentioned data collection period. Women were included who were at least 18 years of age, diagnosed with UI (any etiology), and entered the pelvic physiotherapy service.

Patients who did not adhere to BT treatment were excluded from data analysis (attendance at a minimum number of meetings was required), as well as those who did not respond to the research questionnaires.

Group behavioral therapy

Behavioral therapy is the first stage of a physiotherapist treatment in the ambulatory clinic. The BT group is composed of up to ten patients, and occurs once a week for four consecutive weeks.

Each meeting has three stages: 1) 25 minutes for exhibition of themes; 2) ten minutes for dialogue between professionals and patients to respond to possible questions and share experiences; 3) ten final minutes to review the most important topics, accounting for a total of 45 minutes of activity. These meetings are interactive, fun, expositive, and adddress the following themes: female anatomy, pelvic floor function, UI types, risk factors and treatment for UI, life habits that contribute to or prevent UI, bladder training, and techniques to delay urination (urge-inhibition and pre-contraction) and avoid urine loss. Chart 1 represents BT protocols used in the research during the first four weeks and one month after conclusion of the BT.

Chart 1 - Synopsis of behavioral therapy (BT) protocols and data collection flow

1st week	2nd week	3rd week	4th week	1 month after BT conclusion
BT 1 protocol	BT 2 protocol	BT 3 protocol	BT 4 protocol	
Q1* administration	UI types and risk factors	Appropriate frequency and urinary habits	PFM pre-contraction techniques and urge-inhibition	Q3* administration
Female reproductive and urinary system anatomy	Bladder irritating food	Position to urinate and expel	UI treatments	-
PFM anatomy and functions	-	-	Q2* administration	-

Note: UI = urinary incontinence; PFM = pelvic floor muscles. * Administration of King's General Questionnaire (KGQ) and Incontinence Severity Index (ISI), first days (Q1), in the end (Q2) and one month after BT.

Data collection and instruments

Data collection started after receiving approval from the Research Ethics Committee of the Assis Chateaubriand Maternity School, with opinion number 45415815.3.3001.5050. At the first BT meeting, patients were invited to participate in the research, and received explanation about its goals. The women who accepted signed the Terms of Free and Informed Consent form. Data collection occurred using medical records and

evaluation files from the pelvic health physiotherapy service, containing clinical (UI types and bladder storage and voiding symptoms), and sociodemographic data (age, skin color, job, marital status, level of education). Afterward, the instruments were used during an interview by researchers capable of administering the King's Health Questionnaire (KHQ) and the Incontinence Severity Index (ISI), who were not involved in conducting the intervention. The questionnaire was administered at three times: 1) BT's first day (KHQ1, ISI-Q1); 2) BT's end (KHQ2, ISI-Q2); 3) one month after BT (KHQ3, ISI-Q3), as seen in Chart 1.

King's Health Questionnaire (KHQ)

The impact of UI on QoL and urinary symptoms were evaluated using the KHQ. The questionnaire is composed of 31 questions, divided into eight categories: general health perception, UI impact, daily activity limitations, social limitations, personal relations, emotions, and sleep/mood. Each KHQ category has its own score; therefore there is not a general score. The scores vary from 0 to 100; the higher the score, the lower the QoL in that respective category. The internal consistency of the Portuguese version of the KHQ was satisfactory (Standardized Cronbach α coefficient = 0.87).[12]

Incontinence Severity Index (ISI)

To classify the severity of UI the ISI scale was used, which is a short instrument, composed of two questions about frequency and quantity of urinary loss. The final score, obtained from the multiplication of frequency and quantity scores, generates the UI severity classification: 1 to 2 = light, 3 to 6 = moderate, 8 to 9 = severe, 10 to 12 points = very severe.[13] Currently, this instrument is utilized in clinical and epidemiological studies; recommended by the ICS, with a great level of reliability (Cronbach α coefficient = 0.93, and intraclass correlation coefficient = 0.96), and satisfactory construct validation ($r = 0.72$, $p < 0.01$).

Protocol adherence

Participant adherence was considered sufficient when they attended more than half of the total treatment, or at least three meetings. The attendance was weekly, verified by the researchers.

Data analysis

The collected data was entered into MS Excel® and the statistical analysis was conducted using SPSS, 20.0 version (USA). Categorical data description was provided using absolute numbers and percentage; description of continuous variables, using means and standard deviations. The comparison before and after the BT was made using the paired student t-test for continuous variables, such as KHQ questionnaire domains, and chi-square for categorical variables, such as the UI severity classification, which was evaluated by the ISI. The comparisons happened between moments 1 (before BT) and 2 (end of BT), and also between moments 1 and 3 (a month after BT). A five percent significance level was considered for all the tests.

Results

In total, 160 women were eligible to participate in the group BT, but 13 did not adhere to BT, and one of them did not respond to the questionnaires; the final sample was composed of 146 participants.

Mixed urinary incontinence was the most prevalent type (58%) (Table 1). The participants' average age was 55.95 ± 11.33 years old. The mean body mass index (BMI) value was 29.47 ± 4.99, with a prevalence of overweight (31.5%). In relation to ethnicity, the majority were brown or black (70.9%), 69 completed primary school (48.9%), more than half of the sample had some paid occupation (53.1%) and were in a relationship (51.7%) (Table 1). The urinary symptoms reported in the bladder storage stage were: nocturia (84.9%), urgency (83.6%), urge incontinence (80.8%), and pre-urination loss (84.5%). The most prevalent voiding symptoms were stress urinary incontinence (84.2%), feeling of incomplete (bladder) emptying (73.8%), and postmicturition leakage (61.5%).

In the KHQ application, 135 women responded to KHQ1, 131 to KHQ2, and 62 to KHQ3. During the three questionnaire administration points, the highest QoL scores were seen in the UI impact domain, and the lowest scores were those related to social limitations (Table 2). In the results of KHQ1 compared to KHQ2, UI impact domain scores, physical limitation, personal relations, emotions, and general perception of health domains showed a significant statistical reduction ($p < 0.05$) (Table 2).

Comparing KHQ1 to KHQ3, a significant statistical reduction was noticed ($p < 0.05$) in the general health perception, incontinence impact, daily activity limitations, physical limitations, emotions, and sleep, which shows a lower UI impact on the QoL in those domains at the end of BT (Table 3).

Administration of the ISI scale identified a reduction in these women's UI severity, in the comparison between ISI-Q1 and ISI-Q2 ($p < 0.001$), also when comparing ISI-Q1 to ISI-Q3 ($p < 0.001$). Figure 1 shows a gradual "severe" and "very severe" categories decrease, and the growth of "moderate" and "light" categories, which are a consequence of the three questionnaire administration points (ISI-Q1, ISI-Q2- ISI-Q3), showing urinary symptom improvement.

Table 1 - Urinary incontinence type (UI) and participants' sociodemographic characteristics (n = 146)

Characteristics	n	%
Categories of UI*		
Stress UI	36	25.2
Urge UI	24	16.8
Mixed UI	83	58.0
Age Groups		
< 60 years	84	57.5
≥ 60 years	62	42.5
Skin collor*		
White or yellow	38	28.9
Brown or black	95	70.9
Indigenous	1	0.7
Level of education*		
Illiterate	3	2.1
Primary school	69	48.9
High school	59	41.8
Higher education or more	10	7.1
Paid occupation*		
Yes	77	53.1
No	68	46.9
Domestic partnership*		
Yes	75	51.7
No	70	48.3

Note: *Lost data.

Table 2 - King's Health Questionnaire (KHQ) measures comparison in the beginning (Q1) and immediately after (Q2) the behavioral therapy's finish (n = 131)

Domains KHQ	Q1 mean ± SD	Q2 mean ± SD	p-value Q1 vs Q2
General health perception	48.52 ± 27.98	38.14 ± 23.27	**< 0.001**
Incontinence impact	57.77 ± 33.95	40.83 ± 31.00	**< 0.001**
Role limitations	39.44 ± 29.54	28.61 ± 27.26	**< 0.001**
Physical limitations	42.83 ± 33.04	35.39 ± 31.29	**0.006**
Social limitations	22.85 ± 24.69	19.04 ± 24.25	**0.057**
Personal relationships	33.99 ± 35.84	26.75 ± 30.19	**0.028**
Emotions	37.28 ± 30.24	30.13 ± 28.09	**0.001**
Sleep/Energy	38.09 ± 30.54	34.45 ± 30.43	0.107
Severity measures	32.80 ± 23.06	31.16 ± 22.48	0.348

Note: Values in bold indicate siginificant statistic difference ($p < 0.05$).
SD = standard deviation

Table 3 - King's Health Questionnaire (KHQ) measures comparison before the start (Q1) and one month after (Q3) behavioral therapy (n = 62)

Domains KHQ	Q1 mean ± SD	Q3 mean ± SD	p-value Q1 vs Q3
General health perception	45.54 ± 29.04	34.82 ± 20.04	**0.003**
Incontinence impact	57.73 ± 33.32	34.67 ± 24.40	**< 0.001**
Role limitations	38.18 ± 26.38	24.24 ± 25.62	**< 0.001**
Physical limitations	39.25 ± 29.33	25.92 ± 23.71	**0.001**
Social limitations	19.19 ± 21.85	15.35 ± 21.32	0.136
Personal relationships	24.20 ± 32.13	16.26 ± 27.91	0.101
Emotions	30.23 ± 20.04	22.48 ± 21.88	**0.011**
Sleep/Energy	34.07 ± 25.61	23.33 ± 24.46	**0.003**
Severity measures	36.29 ± 20.42	30.49 ± 20.74	**0.031**

Note: Values in bold indicate siginificant statistic difference ($p < 0.05$).
SD = standard deviation.

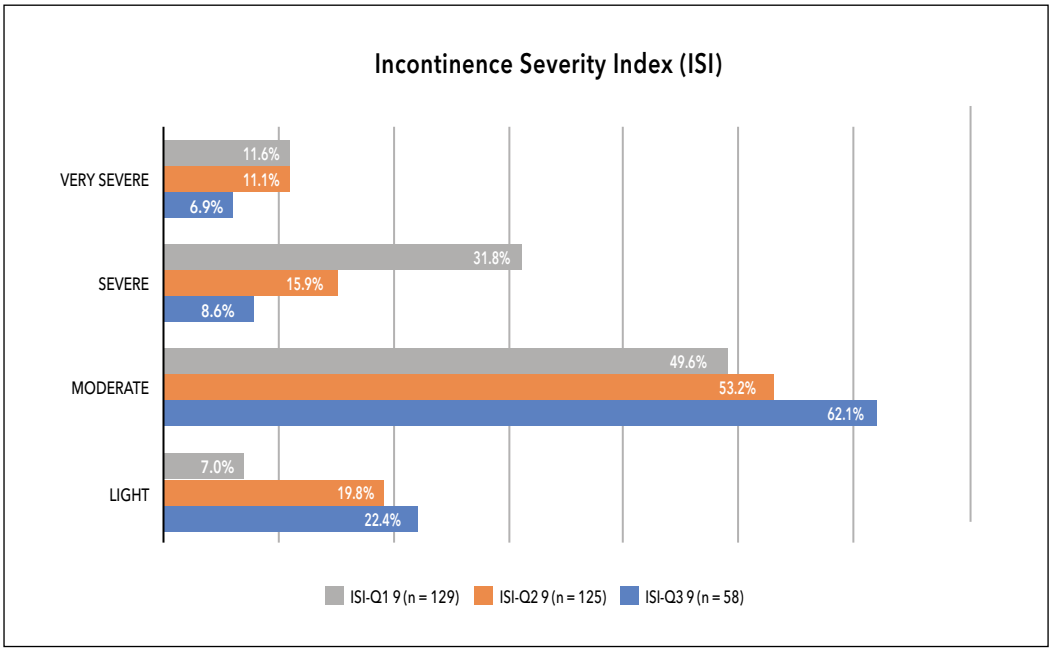

Figure 1 - ISI category percentage related to incontinence severity before the beginning (ISI-Q1), immediately after (ISI-Q2), and one month after (ISI-Q3) behavioral therapy.

Discussion

This study showed that women participating in BT obtained lower UI impact scores on QoL, and presented a urinary incontinence severity reduction. Many QoL domains got significantly better immediately after BT. The results are even clearer one month after the intervention, with a score decrease in all KHQ's domains. The ISI scale results about UI severity follow the reduction, reaffirming improvements in the participants' health, who used BT as a primary conservative treatment. It is necessary to understand that the participants need some time to incorporate information and make changes in their routine habits.

Urinary incontinence is a health problem that can advance with age, and which is more prevalent in women. It not only causes social and hygiene problems, but also affects occupational activities and sexual life, decreasing the QoL.[14] Today's resources to fight UI are information campaigns to identify early symptoms, conservative BT programs, pelvic floor muscle training (PFMT), pharmacotherapy, and surgical interventions.[15,16] According to the European Urology Association, the UI treatment should start with BT and PFMT, and pharmacotherapy or surgical interventions should be used only if the conservative alternatives do not show satisfactory results.[16]

The BT is indicated as a primary intervention for patients that suffer from UI, due to the growing pursuit for lower cost, and less invasive methods to face the problem,[15] as happens in BT with behavior adjustments, bladder training, and diet changes.[17,18] This may or may not be associated with PFMT. This group intervention study chose not to associate BT with a PFMT protocol, because it requires an individualized approach initially, in order to respect individual characteristics and each woman's PFM functions.[19] This way, the study effects were isolated only by behavioral orientations, which facilitates the future use of the approach by multidisciplinary teams in public health services.

The impact of UI on women's QoL as measured by the KHQ is highly recommended by the ICS. Obervational studies executed in Brazil demonstrated a lower prevalence of MUI and nocturia in elderly women, impacting QoL in all KHQ domains.[20-22] This study reaffirms these statements, also observing a higher MUI and nocturia prevalence, and higher score in the "urinary incontinence impact" domain. Caldas et al.[23]

indicate that elderly women who suffer from UI report that BT treatment brings self-esteem improvements, UI reduction, and facilitates addressing of their health conditions.

Thus, the study confirms that correctly implemented behavioral approaches directly impact QoL improvement, and also promote education related to self-care, treatment adherence, and correct management related to incontinence problems.[23]

A randomized clinical trial conducted with women with UI investigated the impact of behavior changes on urinary symptoms, concluding that the group intervention was effective in UI severity reduction, increasing the pelvic floor muscle power and improving urination frequency.[24] Another study with 232 women affirmed the effectiveness and financial viability of BT for reducing UI severity, urination frequency, and QoL improvement.[25]

In addition, a study that investigated unsupervised PFMT and BT concluded that two months after treatment, there was a significant UI improvement, with a reduction in the number of incontinence episodes, and also with better scores after questionnaire administrations.[26] This present study evidence that the changes proposed by BT could reduce the negative impact of UI. It is important to state that even if the protocol in udse did not include a PFMT regimen, women went through a PFM assessment, therefore, they had conscious contraction control. This conscious control allows for a pre-contraction technique training orientation (the knack), which is the ability to contract PFM during activities that cause a rise in intraabdominal pressure, and urge supression technique, where fast PFM contractions are made during the urgency peak, in order to inhibit bladder detrusor muscle contraction.[27]

In addition to the present study, So et al.[28] also implemented a self-care educative program for women with UI, once a week, for five consecutive weeks, without using PFMT, leading to a significant improvement related to UI severity and also the inferior urinary symptoms.

The promising BT results in groups predict improvement in function and a reduction in the negative effects of incontinence on QoL, from the learning improvement acquired during BT, in daily routine, and by self-care development. Despite the easy application, behavioral interventions depend on the patient's adherence to achieve positive results.[29]

In the present study, some factors could have interfered and made it harder to complete the questionnaires, such as the low educational level of the participants. Furthermore, as it is a reference service, many women live far from the health unit, which makes it harder for them to participate in all BT sessions. However, this study reflects the public service reality with good results using the chosen approach.

The present study naturally has its limitations for being observational in nature, without being able to compare BT effectiveness to a control group. The strengths are the sample size and the innovative BT approach in a group as a primary treatment option, before individualized physiotherapy.

The obtained results reaffirm the literature reports with people from different countries,[18,23,25,28] showing that BT can be implemented in a Brazilian health system context for women with UI. To enable the integration of group BT in a conservative UI treatment, we must face the challenge of encouraging people to join meetings in person, and also promoting healthy habit changes, making the participants more independent with their own treatment. However, after BT, it is necessary to identify those women who continue to require a multidisciplinary and individualized physiotherapy approach.

Conclusion

The reduction in the impact of UI on QoL was noticed in many KGH domains, as well as UI severity reduction on women participating in group BT, used as single intervention, as a first-line treatment option. The mentioned results were noticeable especially from a longer-term perspective, because the process includes changes in habits that naturally take time to be established.

Authors' contributions

The study was developed by RMC and SLN. ACRM and RMC were responsible for data collection, and ACRM and SLN for its analysis. All the authors contributed to the writing process and the article review, and also to final version approval.

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Women's perception about hydrotherapy in postmenopause: a qualitative study

Percepção de mulheres sobre a fisioterapia aquática na pós-menopausa: um estudo qualitativo

Raquel Backes
Ana Paula Maihack Gauer *
Édina Luísa Jahnel
Viviane Jacintha Bolfe Azzi

Universidade do Oeste de Santa Catarina (UNOESC), São Miguel do Oeste, SC, Brazil

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*** Correspondence:** ana.gauer@unoesc.edu.br

Abstract

Introduction: The transition from reproductive to post-reproductive life is part of the female life cycle that impacts well-being, with menopause as a significant milestone. Regular physical activity should be encouraged to mitigate the symptoms of menopause and prevent age-related problems. Hydrotherapy is one such alternative, since immersion in heated water facilitates exercises that would be difficult to perform on land. **Objective:** Assess women's perception about the effect of hydrotherapy on the signs and symptoms of postmenopause. **Methods:** A qualitative study in which participants underwent 48 hydrotherapy sessions and answered a semistructured interview. **Results:** The participants were eight women, aged 55.75 ± 8.55 years, menopausal for 8.5 ± 7.98 years, with vasomotor symptoms (100%), mood swings (87.5%), sleep disorders (87.5%), vaginal dryness (62.5%), low sex drive (62.5%) and chronic pain (100%). **Conclusion:** Women's perception about the effects of hydrotherapy on the signs and symptoms of postmenopause include less pain and muscle tension, a decline in the signs and symptoms, better quality of life and sexual pleasure, and an improvement in biopsychosocial factors such as anxiety and stress through better social interaction.

Keywords: Hydrotherapy. Physical therapy modalities. Postmenopause. Women's health.

Resumo

Introdução: *A transição da vida reprodutiva para a pós-reprodutiva é considerada um dos ciclos da vida feminina que gera impactos no bem-estar da mulher, sendo a menopausa o marco significativo. A prática regular de atividade física deve ser encorajada para reduzir os sintomas da menopausa e prevenir alterações associadas ao envelhecimento. Assim, a fisioterapia aquática é uma opção de atividade física, pois a imersão em água aquecida possibilita a realização de exercícios que seriam difíceis de serem executados no solo.* ***Objetivo:*** *Evidenciar a percepção de mulheres sobre a fisioterapia aquática nos sinais e sintomas da pós-menopausa.* ***Métodos:*** *Trata-se de um estudo qualitativo, com participantes que realizaram 48 sessões de fisioterapia aquática e responderam a uma entrevista semiestruturada.* ***Resultados:*** *Participaram do estudo oito mulheres, 55,75 ± 8,55 anos, menopausadas há 8,5 ± 7,98 anos, com referência de alterações vasomotoras (100%), do humor (87,5%), do sono (87,5%), secura vaginal (62,5%), diminuição da libido (62,5%) e dor crônica (100%).* ***Conclusão:*** *A percepção das mulheres sobre os efeitos da fisioterapia aquática nos sinais e sintomas da menopausa aponta para uma diminuição do quadro álgico e da tensão muscular, diminuição dos sinais e sintomas da pós-menopausa, melhora da qualidade do sono, bem como do prazer sexual, e melhora nos fatores biopsicossociais como ansiedade e estresse, através da melhora da interação social.*

Palavras-chave: *Hidroterapia. Modalidades de fisioterapia. Pós-menopausa. Saúde da mulher.*

Introduction

There are specific periods in the female life cycle that warrant special attention due to their impact on health and well-being.[1,2] One such cycle is the transition from reproductive to post-reproductive life, with menopause as a significant milestone. Characterized as the natural cessation of the menstrual cycle, menopause is diagnosed after 12 consecutive months of amenorrhea and typically occurs between the ages of 45 and 52 years.[3,4]

Although menopause is directly related to ovarian aging, it also influences the hypothalamic-pituitary-ovarian-uterine axis, triggering signs and symptoms that characterize the onset of menopause (climacteric)[5] and can persist for up to 10 years after the cessation of menstrual cycles.[3] Irregular menstrual cycles, vasomotor symptoms such as night sweats and a sudden feeling of heat (hot flashes), difficulty sleeping or insomnia, vaginal dryness, low sex drive and mood swings are the most commonly reported signs and symptoms.[3,6]

Muscle and joint pain are also typical during this time; however, it is important to consider the influence of lifestyle and aging-related factors in these body changes and complaints, making it difficult to pinpoint a single factor.[4,7] Thus, measures aimed at controlling weight, engaging in physical exercise and improving sleep quality are considered first-line strategies for pain management in these cases.[7]

Regular physical activity should be encouraged to mitigate the signs and symptoms of menopause and prevent and treat age-related problems.[3] Previous studies have highlighted the importance of regular physical activity, reporting that worse physical performance is related to more intense climacteric symptoms and low physical activity levels.[1,8] Nguyen et al.[9] observed improvements in the psychological, sexual and vasomotor aspects of menopausal yoga practitioners and highlighted the need for quality studies that assess other exercise modalities.

Hydrotherapy is one such modality and has gained ground, since immersion in heated water facilitates exercises that would be difficult or impossible to perform on land.[10] The mechanical and thermal properties of water allow the body to relax and improve joint mobility, motor coordination, pain and blood flow.[9,11] Additionally, aquatic activities in a group setting contribute to improving the self-esteem and social interaction of the participants, positively affecting their physical and psychological aspects[12] and thus helping them to cope with stages of life that require specific strategies, such as postmenopause.

Given the association between the physiological changes of aging and the chronological process of menopause and postmenopause, there is an urgent need for research on nonpharmacological therapies to help manage these issues. In this respect, the present study aimed to assess women's perception regarding the effect of hydrotherapy on the signs and symptoms of postmenopause, provide support for health professionals and promote future research by expanding scientific discussion.

Methods

This study used a qualitative approach, whereby participants were chosen for the representativeness rather than to satisfy a certain sample size, allowing the issue to be addressed in multiple dimensions. This approach favors participants who have traits that the researcher is interested in studying, characterizing intentional sampling.[13]

Participants were women who had attended hydrotherapy for at least six months, reported no menstruation for at least 12 consecutive months and complained of two or more of the following symptoms: vasomotor symptoms (sudden feelings of heat with no apparent cause and intense night sweats capable of interrupting sleep), sleep disturbances (difficulty sleeping, insomnia or poor-quality sleep), mood swings (irritability, anxiety or sadness), vaginal dryness, hair loss or low sex drive.

The hydrotherapy sessions were conducted during the practical activities of a supervised internship in primary healthcare as part of the physiotherapy course of the University of West Santa Catarina (UNOESC). Eight women were invited to participate in the study, all of whom were part of a Hydrotherapy for Women's Health group aimed at relieving pain, improving blood flow, joint mobility and muscle activation, cardiovascular endurance and relaxation exercises. The 60-minute sessions were conducted in a heated pool, twice a week over a 24-week period, as follows: 5-minute warm-up, 15 minutes of resistance exercises, 15 minutes of mobility exercises, 20 minutes of cardiovascular endurance exercises and 5 minutes of relaxation techniques.

A semistructured interview of open-ended and closed-ended questions was applied in order to understand women's perception of the effect of hydrotherapy on postmenopausal signs and symptoms. According to Minayo,[13] an interview is a conversation between two or more people aimed at compiling information relevant to an object of study. In semistructured interviews, interviewees have an opportunity to speak freely on the issue under study without following formulated questions and reflect on their experiences during a particular time.[13]

The script for the interview was compiled by the authors and contained questions on the identity of the participants, the presence of pain and chronic diseases, use of medication, reason for seeking hydrotherapy, a brief description on lifestyle habits, social life and religious activities, participants' experience in hydrotherapy, their perceptions about the effects of immersion and physiotherapy on the body, and their mood, social relations, disposition, sleep quality, sexual activity, vasomotor symptoms (hot flashes and night sweats), in order to understand physical symptoms and postmenopausal symptoms during the study period. The 32 to 56-minute interviews (average of 44 minutes) were previously scheduled by telephone according to participants' availability and conducted in a private room next to the physiotherapy laboratory. Data were collected in November 2020 and all the necessary measures to minimize the risks of COVID-19 transmission were adopted.

For the purpose of greater accuracy, all the interviews were recorded. Next, they were transcribed, eliminating grammar mistakes, linguistic errors and semantic weight. Codes were used to identify the participants in order to protect their identities, as follows: P1, P2, P3, P4, P5 and so on. The interviews were validated by email, requesting that participants confirm the information within 15 days. Data from the empirical material were analyzed by the researchers in three stages, using content analysis:

1. Pre-analysis: according to Minayo,[13] skimming requires direct intense contact with the material, engaging with the content; studying and organizing the material to respond to questions of validity such as completeness, representativeness, homogeneity and relevance; formulating and reformulating hypotheses and objectives based on exhaustive reading and initial questions. Pre-analysis includes establishing the recording units (keywords or sentences), context units (outlining the context of understanding the recording unit), relevant excerpts, categorization format, coding format and more general concepts guiding the analysis.[13]

2. Analyzing the material: the second stage of thematic analysis is examining and understanding the text. The information was categorized by separating the text into recording units.

3. Processing and interpreting the results obtained: Interpreting the data, categorized according to the theoretical framework.

The project that gave rise to this study was approved by the UNOESC Research Ethics Committee under protocol number 4.250.630 and all the relevant ethical principles were followed.

Results

Participants were 8 women aged between 43 and 69 years. Of these, four were married and four divorced; one was on sick leave, two worked in general services and five were retired (Table 1). In regard to the presence of postmenopausal signs and symptoms, there were reports of vasomotor symptoms, sleep disturbances, mood swings, vaginal dryness, hair loss and low sex drive (Table 2).

Table 1 - Sample characterization (n = 8)

Variables	Mean ± standard deviation
Age (years)	55.75 ± 8.55
Time in postmenopause (years)	8.5 ± 7.98
Marital status	**n (%)**
Married	4 (50.0)
Divorced	4 (50.0)
Schooling level	**n (%)**
Elementary education	4 (50.0)
High school diploma	2 (25.0)
College degree	2 (25.0)
Physical activity	**n (%)**
Yes	3 (37.5)
No	5 (62.5)
Employment status	**n (%)**
General services	2 (25.0)
Retired	5 (62.5)
Sick leave	1 (12.5)

Table 2 - Absolute and relative frequency of the presence of postmenopausal signs and symptoms (n = 8)

Symptoms	n (%)
Vasomotor symptoms	
Yes	8 (100)
No	0 (0)
Mood swings	
Yes	7 (87.5)
No	1 (12.5)
Sleep disturbances	
Yes	7 (87.5)
No	1 (12.5)
Vaginal dryness	
Yes	5 (62.5)
No	3 (37.5)
Low sex drive	
Yes	5 (62.5)
No	3 (37.5)
Hair loss	
Yes	4 (50.0)
No	4 (50.0)
Presence of chronic pain	
Yes	8 (100)
No	0 (0)
Continuous use medications	
Yes	1* (12.5)
No	7 (87.5)

Note: *Atenolol.

The empirical material obtained from the interviews was interpreted via content analysis and provided the following analytical categories: reduced pain and muscle tension; decline in postmenopausal signs and symptoms; better sleep quality; sexual pleasure and quality; improvement in biopsychosocial factors/social interaction.

Discussion

The first category related to perceptions about the effect of hydrotherapy on postmenopausal signs and symptoms was reduced pain and muscle tension, as indicated in the statements below:

[...] *with the suspension of hydrotherapy classes during the pandemic, my muscle and joint pain increased and my joints felt stiffer; once classes started again, all the aches improved* [...] *it was quite an ally in relieving my pain* [...] (P1)

My sciatica cleared up completely; when I do feel pain, it's much milder and less intense [...] *my pain has gone from 100% to 10 %* [...] (P2)

After I started hydrotherapy, on a scale of 0 to 10, my pain was initially a 9 and then 2, and now I don't need pain medication anymore. (P7)

After I started hydrotherapy, my sciatica improved, and I went for month without an episode; the duration and intensity of the pain also improved. Now my sciatica is completely gone. (P8)

Women undergoing menopause complain of generalized musculoskeletal pain.[4,7] Kozinoga et al.[14] reported that perimenopause is associated with increased low back pain and heightened pain perception in relation to women from other age groups, with weight gain indicated as a risk factor. Although there seems to be a strong correlation between musculoskeletal pain and estrogen deficiency, a causal link has yet to be established,[7] indicating the need for qualified research to determine the extent to which chronological aging and hormonal changes influence pain perception.

Regardless of the association or not with causal factors, participants' statements indicate a decline in perceived pain, muscle tension and joint stiffness as effects of hydrotherapy. Physical exercise stabilizes muscles, with a positive effect on muscle pain and tension, generating a feeling of relief.[15-19]

Reduced pain is a therapeutic effect achieved by hydrotherapy even in chronic cases.[20,21] The physiological effects of immersion, buoyancy and the thermal capacity of water increase the pain threshold, facilitating joint movement and reducing painful muscle spasms.[17,22,23] The analgesic action of hydrotherapy is based on higher dopamine levels in the central nervous system, which persist for several hours after immersion, resulting in less pain and a feeling of well-being.[24] As such, hydrotherapy improves cases of chronic pain, positively interfering in the feedback loop between pain and increased muscle tension, and can be used as a resource in women's health.

As indicated in the statements below, a decline was also reported in the signs and symptoms of postmenopause, a milestone in the female aging process:

[...] *before hydrotherapy I had them every day (referring to menopausal symptoms); after I started the classes my symptoms improved, only emerging every fifteen days or so and then not for several months at a time.* (P1)

[...] *when I started hydrotherapy, I still had hot flashes that would come out of nowhere for no apparent reason, and vaginal dryness, but these symptoms improved a lot afterwards.*(P3)

I was experiencing hot flashes, mood swings, insomnia and poor sleep when I started hydrotherapy [...] *the classes really helped to reduce the intensity of my menopausal symptoms* [...] (P4)

[...] *I started experiencing signs and symptoms of menopause in early 2019, including hot flashes, severe night sweats that interrupted my sleep, insomnia, vaginal dryness, hair loss and low sex drive, but these improved over time* [...] *Hydrotherapy really helped me, even in controlling the intensity of the symptoms. Now I only experience them once a month.* (P8)

Regular exercise has a positive effect on controlling postmenopausal signs and symptoms and is one of the most widely recommended nonpharmacological resources in the literature.[3,7,9,25,26] Berin et al.[27] observed a decline in the frequency of moderate-to -severe hot flashes among postmenopausal women after 15 weeks of resistance training. The authors suggested that central beta-endorphin production triggered by exercise stabilizes women's thermoregulation during this period. In a systematic review, Manojlović et al.[28] reported that training combined with resistance and aerobic exercise reduces arterial stiffness in postmenopausal women, improving cardiovascular function.

A qualitative study that aimed to investigate the experience of menopausal women with physical exercise demonstrated that it can mitigate menopausal symptoms and provide other health benefits; the women also reported that physical activity was their preferred strategy for treating these symptoms.[29] Thus, hydrotherapy can contribute to improving the characteristic signs and symptoms of menopause and the group setting favors mental well-being and age-related aspects, providing physical and functional benefits.[30] Follow-up studies should be conducted to verify these outcomes.

In addition to mitigating menopausal signs and symptoms, participants also reported better sleep quality:

I noticed a substantial improvement in sleep quality after hydrotherapy [...] (P3)

After hydrotherapy my sleep quality really improved. (P6)

I suffered from poor sleep quality because of the pain, but since starting hydrotherapy my sleep has really improved [...] (P8)

My anxiety really affected my sleep quality; physiotherapy helped me to control my anxiety and now I sleep much better [...] but after starting hydrotherapy my anxiety really improved. (P6)

Sleep difficulties increase as women approach menopause, since vasomotor symptoms generally interfere in sleep and may be associated with reports of sleep disturbances.[31] Regular physical exercise can

contribute to improving sleep quality.[32] The present study demonstrated that sleep quality improved after participants began group hydrotherapy sessions, indicating that this resource contributes to mitigating this symptom, as observed in previous studies.[21,22,33]

Hormonal changes may be responsible for insomnia during menopause and the high prevalence of this sleep disorder may be influenced by psychological changes or other regulatory system disturbances (circadian rhythms), which are often related to aging.[34] Poor sleep can interfere in the routine and activities of daily living of women, negatively affecting their overall health; thus, seeking strategies to control this symptom is essential in helping women navigate menopause in a healthy way.

The women also reported that regular hydrotherapy fosters sexual pleasure and quality, as illustrated in the statements below:

In terms of my sexual activity, I noticed a substantial improvement in hip mobility [...] *after hydrotherapy, my hip movements during sexual activity improved.* (P1)

Sexual relations also improved, my hip and spinal mobility and sexual pleasure are better because the hydrotherapy helped control my pain, which made a real difference. (P3)

Today I enjoy sex more because I feel less pain and that's also helped improve my sexual pleasure because my hip mobility is better. (P6)

For women, in addition to physical limitations and social difficulties, aging can also result in a loss of body image, sexuality and desire, permeated by the prejudice and myths that surround the aging process.[1,35]

One of the hydrotherapy effects mentioned by participants is the recovery of range of motion, improving their execution of daily activities and providing physical, social and emotional benefits. Thus, it was concluded that hydrotherapy can restore women's physical function, improve their self-esteem and revitalize their femininity and sexual pleasure, ensuring better quality of life.

In addition to the participants' perceptions, the relationship between exercise and sexual function has been widely studied, since exercise is a particularly appealing treatment for sexual dysfunctions because it does not carry the stigma often associated with sexual and pharmacotherapy.[36]

Sexual dysfunctions during menopause are typically characterized by unique determinants and risk factors that go beyond estrogen deficiency. However, sexual problems in menopause are underdiagnosed and undertreated. Educating health professionals and patients is vital to improving and maintaining overall genitourinary and sexual health. Treatment should consider symptom severity, effect on quality of life, potential adverse effects and personal preferences,[37] with exercise as an important tool in treating the sexual dysfunctions that affect postmenopausal women.

Some women do not cope well with menopause because they associate it with aging, which in most Western cultures has very negative connotations.[4] Another category mentioned by participants was the improvement in biopsychosocial factors/motivation and social interaction due to hydrotherapy:

Hydrotherapy also helped control my depression [...] *I noticed a significant improvement in my mood and general disposition* [...] *I used to be an independent, active person, but after my surgery I had to depend on others and started to feel depressed, so I looked into group activities, and they helped me a lot* [...] (P1)

Not only did it help improve my everyday anxieties and stress, but it also helped maintain this balance [...] (P4)

My relationship with my husband improved because before I never felt like doing much, I complained and felt stressed, and that really affected our relationship [...] *it also encourages interaction, making us happier and more energetic.* (P7)

It encourages interaction with others, people whose problems are different from mine, and also motivates me to look after and improve myself, and it's fun. (P2)

[...] *we can chat with others and get to know them, their problems and different views, and it motivates us to be better and try and improve ourselves.* (P4)

This study demonstrates the beneficial effects of hydrotherapy on the mental health of the participants, since the combination of the water and group setting promotes positive effects, a sense of well-being and better quality of life.[21,35,38,39]

Silva et al.[40] investigated the effects of aquatic exercise on mental health and oxidative stress parameters in depressed older adults, concluding that a low intensity aerobic exercise program can contribute to reducing anxiety and depression scores, improving functional autonomy and reducing oxidative stress. Given that aquatic and group activities can minimize the effects of stress or anxiety, clinical trials and follow-up studies are needed to analyze practically applicable biomarkers of measurements and effects.

Hydrotherapy provides practitioners with greater social contact. Contact with different personalities, difficulties and pathologies improves interaction and awakens feelings of satisfaction, contributing to self-esteem and promoting wellness and a better quality of life, with a resulting improvement in biopsychosocial factors.

Although the natural aging process causes a physiological decline in hormonal functions in women, hydrotherapy improves their perception of these aspects, making them easier to manage. Moreover, given the physical properties of water, which promote relaxation, analgesia and less impact on joints, hydrotherapy enhances body movement and is used to improve pathological conditions, such as preventing exacerbation and promoting health and well-being.

Limitations of this study include difficulty measuring the effects of the variables due to its design, as well as the reliability of self-reported sleep quality measures and biopsychosocial markers. Randomized clinical trials are needed to assess the physiological effects of hydrotherapy on women, with a longer follow-up period to demonstrate the long-term causal impact, in addition to studies that consider the possible confounding effect on outcomes.

Conclusion

This study demonstrated the perception of women about the effects of hydrotherapy on the signs and symptoms of postmenopause, including reduced pain and muscle tension and an improvement in the signs and symptoms. Hydrotherapy also improved sleep quality and sexual pleasure and mitigated biopsychosocial symptoms such as anxiety and stress through better social interaction. In light of the satisfactory results presented and the aquatic setting, this study could encourage further research in the field of women's health.

Authors' contributions

RB and APMG were responsible for the study design, methodology, data collection, analysis and interpretation, and writing the article. VJBA and ELJ contributed to the methodology, data analysis and interpretation and critical review of the article. All the authors contributed substantially to the conception of the manuscript and approved the final version.

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Musculoskeletal, cardiorespiratory, anthropometric and sensorial changes following breast cancer surgery

Alterações musculoesquelética, cardiorrespiratória, antropométrica e sensorial após cirurgia de câncer de mama

Izabella Martinello de Oliveira Simões [1]
Silvia Regina Barrile [2]
Camila Gimenes [1]
Thainá Tolosa de Bortolli [1]
Marta Helena de Conti [1]
Bruno Martinelli [1*]

[1] Centro Universitário Sagrado Coração (UNISAGRADO), Bauru, SP, Brazil
[2] Faculdade Eduvale de Avaré, Avaré, SP, Brazil

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*** Correspondence:** bnomartinelli@yahoo.com.brr

Abstract

Introduction: Breast cancer is the second most common malignant neoplasm in women. Surgical intervention is one of the recommended treatments, which can lead to significant physical and sensorial sequelae. **Objective:** To analyze the musculoskeletal, cardiorespiratory, anthropometric and sensorial functions of women who underwent breast cancer surgery. **Methods:** An observational, cross-sectional study with women who underwent surgical resection of breast tumors at Amaral Carvalho, a reference hospital in the countryside of the São Paulo State, Jaú/SP, Brazil. Three assessments were obtained: pre-surgery (Ass1), one day after the surgery (Ass2) and 15 days after surgery (Ass3). Sociodemographic and gynecological data were collected, and anthropometric, cardiovascular, dermal sensitivity, range of motion (ROM) of the upper limbs, peripheral oxygen saturation (SpO_2), inspiratory muscle strength (PImax), peak expiratory flow (PEF) and thoraco-abdominal mobility assessments were performed. Data were evaluated by repeated measures ANOVA and Wilcoxon statistical test with a Bonferroni correction ($p < 0.05$). **Results:** Eighteen women, with a mean age of 57.44 ± 9.35 years, mainly with the left side affected (61.1%) and lymphadenectomy performed in 50% of the cases. Differences were found in systolic and diastolic blood pressure, PEF and SpO_2, axillary ROM index (Ass1>Ass2), PImax (Ass3>Ass2), perimetry (Ass2>Ass3), ROM in all axes of shoulder motion and wrist flexion (Ass2<Ass1), and sensitivity alteration close to the surgical wound (Ass3>Ass2 and Ass1). **Conclusion:** The surgery for breast cancer excision resulted in hemodynamic and respiratory changes, especially on the first day after the procedure, returning to baseline values approximately 15 days later.

Keywords: Breast neoplasms. Physical examination. Segmental mastectomy.

Resumo

Introdução: *O câncer de mama é a segunda neoplasia maligna mais encontrada entre as mulheres, sendo a intervenção cirúrgica um dos tratamentos preconizados, o que pode acarretar sequelas físicas e sensoriais importantes.* ***Objetivo:*** *Analisar as funções musculoesqueléticas, cardiorrespiratórias, antropométricas e sensoriais de mulheres submetidas ao procedimento cirúrgico para neoplasia mamária.* ***Métodos:*** *Estudo observacional e transversal com mulheres que realizaram procedimento cirúrgico para ressecção de neoplasia mamária assistidas no interior paulista, Jaú/SP. Foram realizadas três avaliações: pré-cirurgia (AV1), um dia (AV2) e 15 dias após a cirurgia (AV3). Foram coletadas informações sociodemográficas e ginecológicas e realizadas avaliações antropométrica, cardiovascular, sensibilidade dérmica, amplitude de movimento (ADM) dos membros superiores, saturação periférica de oxigênio (SpO_2), força muscular inspiratória (PImax), pico de fluxo expiratório (PFE) e mobilidade toracoabdominal. Os dados foram avaliados pelo teste estatístico ANOVA de medidas repetidas e Wilcoxon com correção de Bonferroni ($p < 0,05$).* ***Resultados:*** *Dezoito mulheres, de 57,44 ± 9,35 anos, tiveram o lado esquerdo mais acometido (61,1%) e a linfonodectomia foi realizada em 50% dos casos. Houve diferenças nas variáveis pressão arterial sistólica e diastólica, PFE e SpO_2, índice de amplitude axilar (AV1>AV2), PImax (AV3>AV2), perimetria (AV2>AV3), ADM em todos os eixos de movimento do ombro e em flexão de punho (AV2<AV1) e alteração de sensibilidade próxima à cicatriz (AV3>AV2 e AV1).* ***Conclusão:*** *A cirurgia para exerese de neoplasia mamária acarretou alterações principalmente hemodinâmicas e respiratórias, sobremaneira no primeiro dia após a cirurgia, retornando aos valores basais aproxi-madamente 15 dias após o procedimento.*

Palavras-chave: *Câncer de mama. Exame físico. Mastectomia segmentar.*

Introduction

Breast cancer (BC) is a disease caused by the anarchic multiplication of abnormal cells in the breast, constituting a tumor with aa metastatic potential. Women are most frequently affected and it is the second most common and lethal malignant neoplasm. The National Cancer Institute (INCA) estimates that the number of new cases of cancer tends to increase in Brazil.[1] The treatment is very expensive, often inaccessible to many women living in developing countries. In addition, survival rates depend on factors such as the quality of treatment.[2] Several treatment options with a potential risk of adverse effects are available. One of the intervention for BC is the surgical treatment, which can be aggressive, depending on the disease staging, biological characteristics of the tumor and clinical conditions (age, menopause, pre-existing diseases).[1,3] This type of intervention can result in changes in the biological systems, and postoperative complications may appear early or late, varying in degrees of severity. The development of lymphedema (the most prevalent complication), for example, caused by partial or complete removal of the lymph nodes, arises from compromised lymph circulation and results in limited range of motion (ROM) of the homolateral shoulder.[4] The extensive network of blood vessels and nerves in the area, increases the risk of injury during the surgical procedure, which can result in sensory and/or motor alterations. Furthermore, the more tissue that is removed, the greater the likelihood of pain, muscle weakness, axillary cord formation, and consequent reduced functionality and sensitivity alterations.[5,6] On the other hand, less invasive surgeries are associated with greater preservation of sensitivity in the chest wall up to two years following surgery when compared to the more invasive ones.[6]

Another aspect of interest is that the greater the proximity of the surgery to the diaphragm, the greater the tendency for pulmonary alterations, consistent with those seen in restrictive breathing patterns, which may reach their peak 24 to 48 hours after the procedure. The variables usually subject to alterations are the forced expiratory volume, vital capacity, tidal volume, and respiratory rate.[7]

In the experience of BC diagnosis and treatment, the assessment of body image is essential to understand the stress generated by changes arising from the disease itself and the entire therapeutic process.[8] Specifically, these changes are related to appearance, psychosocial problems, and physical limitations, causing clinical manifestations in the cardiovascular, respiratory, musculoskeletal, and lymphatic systems.[9]

The perception of the impact of surgical procedures for removal of breast tumor must be individualized, and depends on various aspects, including the biological one. Therefore, it is assumed that the surgery causes musculoskeletal changes that persist after the

intervention, requiring early detection and assessment of musculoskeletal, cardiorespiratory, anthropometric and sensorial functions.

Methods

This was an observational, cross-sectional study, with convenience sampling, conducted at Hospital Amaral Carvalho (HCA) in Jaú, São Paulo, Brazil, and approved by the Research Ethics Committee of the Universidade do Sagrado Coração (protocol no. 1.909.841).

The inclusion criteria were: female gender; age 18 years or older; medical diagnosis of BC; requirement for surgical for breast cancer excision; physical and cognitive conditions to complete the assessment tests; and hemodynamic stability. Women weren't included when they were in terminal stage of the disease; had a history of diagnosis of disabling chronic cardiac and respiratory diseases; wit had h a history of treatment with radiotherapy and/or chemotherapy; reported cardiothoracic surgical procedures in the previous three months. Data from women who withdrew or were absent at one of the assessment times were excluded. Figure 1 shows the sequence of the study stages and the number of women involved.

Personal, clinical, anthropometric, cardiorespiratory, musculoskeletal, and sensorial data were collected. The assessment techniques are presented below, according to the order of execution at the time of collection. They performed by the same evaluator, with the consent of the physician.

The body mass index (BMI) was calculated using the body weight (Kg) and height, obtained by means of a digital anthropometric scale, BKH 200F, with coupling of the stadiometer (Balmak®, Brazil).[10]

The blood pressure was obtained by the auscultatory method, using a calibrated sphygmomanometer, P.A.MED®, with the patient in a sitting position and after a five-minute rest.[11] Heart rate (HR) and peripheral oxygen saturation (SpO_2) were measured with a pulse oximeter, PM100, NewTech®.[12] Subsequently, the women were positioned standing for dynamic chest cytometry. A Coats Corrente®, an inelastic tape measure, positioned horizontally and parallel to the ground in the axillary, xiphoid, and abdominal regions, was used to obtain two measurements of maximum inspiration and expiration per region assessed.[13]

The assessment of the global strength of the respiratory muscles was performed using the Comercial Médica® manovacuometer, measurement level of 0 to 120 cmH_2O, in a sitting position.[14] The peak expiratory flow (PEF) was obtained by means of a maximum inspiration followed by a short, explosive, maximum forced expiration, through the measuring device - Mini-Wright Peak flow meter.[15] Three repetitions were required and the mean of the values obtained was accepted. Then, in the same position, the perimeter of the upper limbs was measured using a tape measure (Coats Corrente®) at the pre-established points: 7 and 14 cm from the articular axis of the elbow towards the shoulder; 7, 14, and 21 cm from the articular axis of the elbow towards the hand.[16]

The sensorial assessment was performed using the Semmes-Weinstein monofilaments, Sorri®, on the dermatome corresponding to the intercostobrachial nerve, with the patient in the sitting position, arms in 90° abduction, external rotation, and forearm in 90° flexion.[17]

The medium goniometer (Futura®), with 0.5-degree accuracy, was used to assess the ROM in the axes of joint movement of the shoulder (flexion, extension, abduction, and adduction) and the wrist (flexion and extension).[18]

The Brief Pain Inventory, composed of a 0-10 scale, was used to grade the intensity, interference of pain in the ability to walk, perform daily work and social activities, mood, and sleep.[19]

The Shapiro-Wilk test was used to assess for normal distribution of quantitative variables. The descriptive analyses were presented by absolute and relative frequencies for nominal variables [n (%)], and by mean ± standard deviation (data with normal distribution), and median (interquartile range) (data with non-normal distribution) for continuous variables. The behaviors of variables in the three moments were analyzed by means of repeated measures ANOVA test (data with normal distribution) or Wilcoxon test (data with non-normal distribution), with Bonferroni adjustment for multiple comparisons ($p < 0.05$).

Results

Eighteen women with a mean age of 57.44 ± 9.35 years participated in this study. The sociodemographic data indicated that the majority was Caucasian, with incomplete elementary school, married, and Catholicism was the predominant religion.

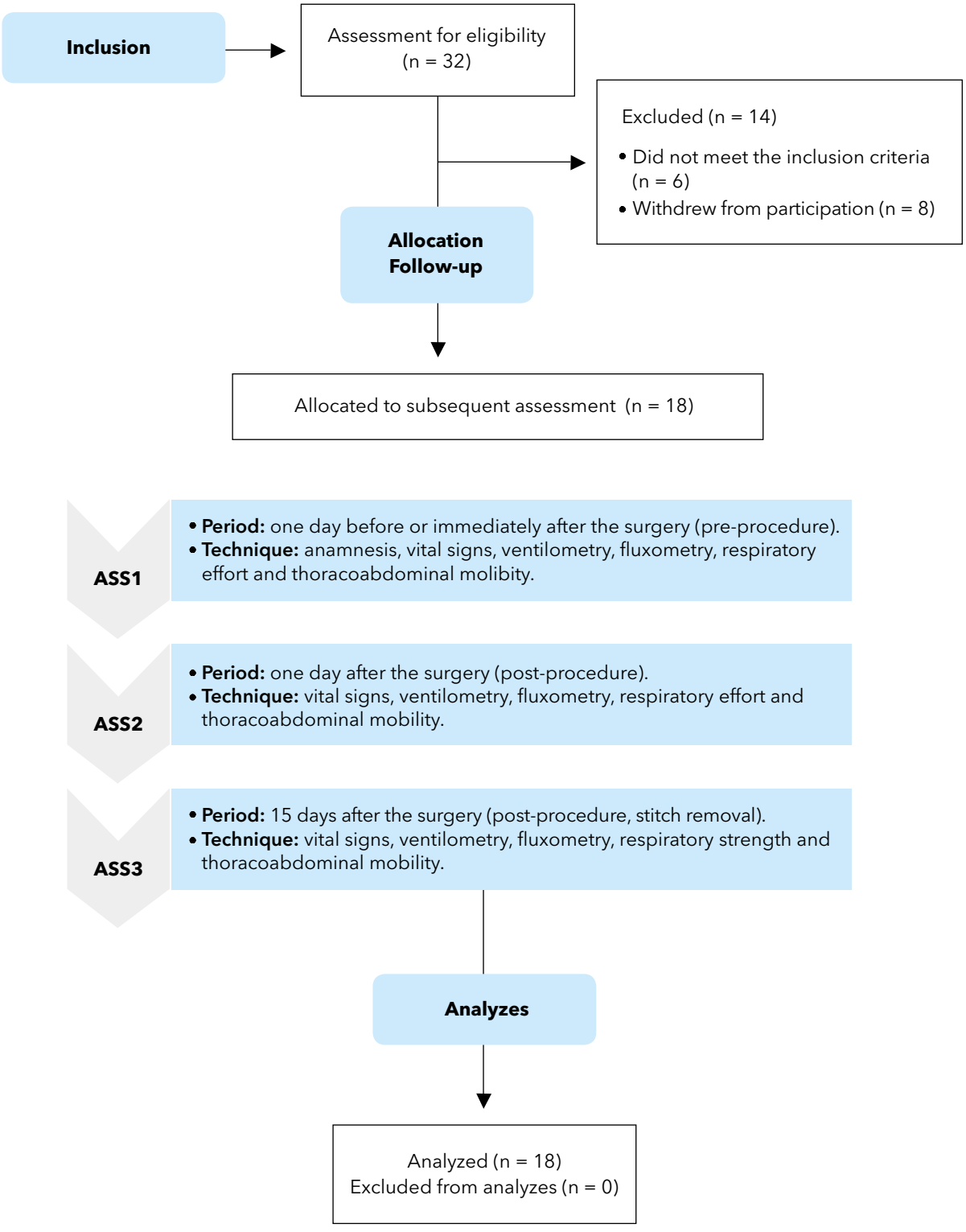

Figure 1 - Sequence of the selection and assessment (ASS) process for women requiring breast tumor excision surgery.

The gynecological history showed menarche with a mean age of 13.2 years, the menopausal phase was found in the majority, and 14 women (77.8%) reported the habit of breast self-examination. The diagnosis of BC was confirmed by biopsy in 16 women (88.9%) and after routine tests (mammography and ultrasonography) in two. Regarding laterality, 15 (83.3%) were right-handed, and most of the surgeries were performed on the left side. The surgical procedures performed were quadrantectomy (22%), mastectomy (28%), lymphadenectomy (28%) and quadrantectomy with lymphadenectomy (22%).

Six women (33.3%) had hypertension, two (11.1%) had diabetes mellitus, and three (16.7%) reported other diseases, with one case (5.6%) of hypertension, diabetes, and obesity.

Table 1 shows the baseline and predicted values of anthropometric and respiratory measurements of the women in the pre-surgical period (Ass1). The sample was classified as being overweight[10] and having expiratory muscle strength below the predicted.[14]

Table 2 shows the cardiorespiratory measurements obtained in the three assessments. There was a reduction in PEF, SBP, and DBP at Ass2 compared to Ass1, and increased SBP, DBP PEF, PImax, SpO2 at Ass3 compared to Ass2. The values obtained in Ass3, 15 days after the intervention, were similar to the baseline values (Ass1). A reduction in axillary amplitude index (AI) was noticed in Ass2 compared to Ass1.

Table 1 - Anthropometric and respiratory measurements of patients in the pre-surgical assessment

Variable	Value
Weight (Kg)	72.86 ± 14.32
Height (m)	1.58 ± 0.05
BMI (Kg/m^2)	28.06 ± 5.22
Predicted PImax (cmH_2O)	82.25 ± 4.52
PImax (% predicted)	99.74 ± 29.76
Predicted PEmax (cmH_2O)	96.00 ± 69.92
PEmax (% predicted)	62.65 ± 22.60
PEF (L/min)	333.33 ± 73.91
PEF (% predicted)	85.65 ± 18.34

Note: BMI = body mass index; Predicted PImax = predicted maximal inspiratory pressure; Predicted PEmax = predicted maximal expiratory pressure; PEF = peak forced expiratory flow.

The measurements of the upper limbs circumference, as well as the identification of the filament by means of sensitivity in the surgical wound area are shown in Table 3.

The range of motion of the shoulder, elbow, and wrist segments are presented in Table 4. No statistical difference was found when comparing the ROM between the homo and contralateral shoulders after surgery. Also, the findings did not show pain and its relationships with activities and perceptions (Table 5).

Table 2 - Cardiorespiratory measurements obtained in the consecutive assessments

Variables	Moments		
	ASS1	ASS2	ASS3
PEF (L/min)	333.33 ± 73.91	267.22 ± 64.60*	332.77 ± 70.27**
PImax (cm$H_2$0)	81.77 ± 23.85	68.44 ± 22.98	82.44 ± 28.71**
PEmax (cm$H_2$0)	50.11 ± 17.51	43.88 ± 19.04	51.11 ± 20.28
Axilar AI	4.43 ± 1.76	3.10 ± 1.13*	3.43 ± 1.39
SpO_2 (%)	96.55 ± 1.54	95.16 ± 2.40*	97.33 ± 1.45**
HR (bpm)	78.16 ± 10.35	80.44 ± 17.01	79.94 ± 12.30
SBP (mmHg)	129.33 ± 14.61	110.00 ± 13.12*	112.61 ± 10.31**
DBP (mmHg)	82.44 ± 6.19	74.11 ± 8.28*	80.22 ± 8.28**

Note: Ass1 = pre-surgery; Ass2 = one day after surgery; Ass3 = 15 days after surgery; PEF = peak expiratory flow; PImax = maximal inspiratory pressure; PEmax = maximal expiratory pressure; axillary AI = axillary amplitude index; SpO_2 = peripheral oxygen saturation; HR = heart rate; SBP = systolic blood pressure; DBP = diastolic blood pressure. *Comparison between Ass1 and Ass2; **Comparison between Ass2 and Ass3.

Table 3 - Perimeter of the hand-arm segment and sensitivity in the surgical wound area in the three assessments

Perimetry	Moments					
	ASS1		ASS2		ASS3	
	R	L	R	L	R	L
14 cm above elbow	32.26 ± 4.30	32.36 ± 4.00	32.48 ± 4.20	32.42 ± 4.11	31.42 ± 3.86†	31.65 ± 3.98
Elbow	26.05 ± 2.60	25.85 ± 2.70	26.29 ± 2.60	26.41 ± 2.72*	25.87 ± 2.54	25.93 ± 2.49†
7 cm below elbow	25.85 ± 2.50	25.37 ± 2.30	25.99 ± 2.30	25.71 ± 2.29	25.55 ± 2.43**†	25.28 ± 2.37†
Hand	16.98 ± 1.40	16.75 ± 1.40	17.28 ± 1.80	7.03 ± 1.24	16.83 ± 1.69†	16.62 ± 1.39
Sensitivity	0.20 (0.2-2.0)	0.20 (0.2-2.0)	1.10 (0.2-2.0)	0.20 (0.2-2.0)	2.00 (0.2-4.0)**†	2.00 (0.2-4.0)**†

Note: Ass1 = pre-surgery; Ass2 = one day after surgery; Ass3 = 15 days after surgery; R = right; L = left. *Comparison between Ass1 and Ass2; **Comparison between Ass1 and Ass3; † Comparison between Ass2 and Ass3.

Table 4 - Range of motion of the shoulder girdle and wrist in the consecutive assessments

Range of motion		Moments					
		ASS1		ASS2		ASS3	
		R	L	R	L	R	L
Shoulder	Flex	162.00 (152.0-170.25)	159.50 (153.75-170.0)	90.00 (85.75-130.50)*	92.00 (70.75-133.0)*	135.00 (97.50-151.25)**†	116.00 (90.0-142.50)**†
	Ext	40.00 (31.50-45.0)	34.00 (30.0-41.25)	31.00 (25.0-39.25)*	28.00 (20.0-36.0)*	41.00 (32.25-45.0)†	39.00 (31.50-42.75)†
	Ab	155.27 ± 19.02	155.05± 22.55	106.88 ± 26.85*	96.66 ± 30.51*	131.72 ± 29.34**†	119.33 ± 34.57**†
	Ad	10.27 ± 4.49	10.05 ± 5.39	7.50 ± 4.70	5.05 ± 4.39*	13.00 ± 7.44	10.33 ± 6.43†
	Int R	75.52 ± 16.11	72.23 ± 18.46	66.62 ± 12.71*	59.25 ± 19.90*	59.33 ± 11.26**	55.28 ± 12.60**
	Ext R	75.94 ± 14.85	79.23 ± 9.09	58.50 ± 22.46*	61.56 ± 20.55*	77.17 ± 11.46†	68.22 ± 13.13**
Wrist	Flex	72.94 ± 10.83	70.77 ± 11.30	65.94 ± 17.00	66.11 ± 12.05	64.50 ± 13.56	66.50 ± 11.32
	Ext	69.11 ± 12.14	65.77 ± 16.26	62.22 ± 15.10*	63.55 ± 15.07	68.33 ± 11.78†	68.83 ± 11.87

Note: Ass1 = pre-surgery; Ass 2 = one day after surgery; Ass3 = 15 days after surgery; R = right; L = left; F = flexion; Ext = extension; Ab = abduction; Ad = adduction; Int R = internal rotation; Ext R = external rotation. *Comparison between Ass1 and Ass2; **Comparison between Ass1 and Ass3; †Comparison between Ass2 and Ass3.

Table 5 - Brief Pain Inventory in the three assessments, considering the 24 hours prior to the questioning

Questions	Moments		
	ASS1	ASS2	ASS3
Worst pain	0.88 ± 2.73	0.00 ± 0.00	1.77 ± 3.59
Low pain	0.61 ± 1.30	1.11 ± 2.72	1.00 ± 2.33
Mean pain	1.00 ± 2.21	0.83 ± 1.87	1.55 ± 3.23
Pain now	0.55 ± 2.02	0.33 ± 0.88	0.72 ± 2.28
Pain relief by medication (%)	11.11 ± 28.86	15.55 ± 37.68	9.44 ± 29.54
General activities	0.38 ± 1.20	0.00 ± 0.00	0.22 ± 1.00
Mood	0.50 ± 1.78	0.27 ± 1.25	0.33 ± 1.50
Walking	0.22 ± 1.00	0.38 ± 1.75	0.44 ± 2.00
Working	0.22 ± 0.77	0.00 ± 0.00	0.27 ± 1.25
Relationships	0.44 ± 1.75	0.16 ± 0.75	0.00 ± 0.00
Sleeping	1.05 ± 3.25	0.61 ± 1.95	1.77 ± 3.70
Enjoying Life	0.72 ± 2.28	0.27 ± 1.25	0.00 ± 0.00

Note: Ass1 = pre-surgery; Ass2 = one day after surgery; Ass3 = 15 days after surgery; 0 = no pain; 10 = worst possible pain.

Discussion

This study aimed to identify possible cardiorespiratory, sensorial, and musculoskeletal alterations in women who underwent excision of BC. An exploratory search of studies related to the our subject did not retrieve similarities in terms of techniques, studied variables, and sample profile, which indicate the originality of this study. Thus, studies with certain similarities will be compared.

The sample had an anthropometric classification of overweight, which is associated with BC. The prevalence of overweight in BC is identified in up to 40 to 50% of cases, and contributes to increased cardiovascular risk, associated comorbidities, and postoperative complications. Thus, weight management should receive attention in the evaluative and therapeutic process of BC.[20]

Compared to the basal status, a reduction in PEmax was found (values less than 80% of the predicted value), similarly to what was found in a study with 20 women aged 57 ± 15.2 years, who had undergone conservative surgery (quadrantectomy) or mastectomy, whose predicted values for respiratory muscle strength [PImax (43.14%), PEmax (40.09%)] and lung function [PEF (49.86%)] were reduced in the preoperative period.[21] The authors did not address this finding, however, in the current study, this may be related to the condition of vulnerability to the diagnosis, apprehension about the surgical procedure to be performed and overweight, as weight and sex may influence the generation of expiratory muscle strength.[22]

Reduction in PEF (66.11 l/min), axillary AI (1.33 cm) and SpO_2 (1.39%) was found in Ass2 when compared to Ass1. Although the SpO_2 values were within normal limits, a reduction of 2.17% was also identified in the immediate postoperative period when compared to Ass3. The values of PImax and PEF obtained in the Ass3 almost returned to those found in Ass1, indicating a re-establishment of these variables in a short period of time.

Consistent with the current finding, Abreu et al.[21], evaluated the pulmonary function and respiratory muscle strength of women who underwent oncologic surgery and identified a decrease in inspiratory muscle strength and pulmonary function (forced vital capacity and expiratory volume) after surgery; 12 to 24 hours after surgery, a reduction in PImax (20.2 cmH_2O) and PEmax (10.4 cmH_2O) was found, which were higher than those identified in the our study. Also, PEF did not change, unlike the present study, in which a reduction of 66.11L/min was identified. A relative degree of respiratory dysfunction was found in the postoperative period, which may be associated with the surgical procedure.[21]

The return to baseline values after a certain period of time following surgery, 15 days later in our study, was also identified in other studies, differing only on the period. Patients diagnosed with BC (n = 41) and surgically treated showed no change in thoracoabdominal expansibility and respiratory muscle strength when comparing the pre-and late postoperative values at 40 days.[23] Therefore, the respiratory occurrences found in this study can be justified by an interference in physical aspects (surgical act and related techniques) and emotional aspects (fear of pain and compromising the surgery, in addition to the attitude of self-protection), which can restrict the breathing pattern.[21]

No changes in pain were observed in any of the activities and assessments. The absence of pain observed in Ass2 was probably due to the use of post-surgical medications. In addition, these medications used in BC surgical procedures may decrease blood pressure, as observed in Ass2 (systolic blood pressure: 19.33 mmHg; diastolic blood pressure: 8.33 mmHg),[24] and sensorial changes after surgery were evident, both due to the healing process and to the use of analgesic medications. Notably, breast sensitivity is altered and sensorial loss is partial in most women.[25] The sensitivity level of 21 women diagnosed with BC and surgically treated was altered on the homolateral side of the surgery (76.19%), the area surrounding the surgery (57.14%), the axillary region (61.9%), the lateral region of the chest (33.3%), and in the medial region of the arm (42.86%).[26] Alteration in tactile sensitivity only in the healing region was identified in our study, with an incidence of 44.44% and more accentuated in the Ass3, a lower value when compared to the aforementioned study. In mastectomized women, the report of pain varied from 54.5% to 36.4% according to the region assessed, and was more intense in the arm.[27] Sitting time, quality of life and body image in women who underwent radical mastectomy were also situations that alter mainly the sensation of pain, generating a decrease in quality of life.[28] The clinical phenomenon pain exists in cancer, and it is difficult to evaluate and treat, because it involves several mechanisms of manifestations and rating levels. The medication approach contributes to alleviate it, but not to reduce the severity of pain or improve quality of life.[29]

Musculoskeletal changes were found, especially in the Ass2 when compared to the other evaluations, with reduced ROM and increased perimeter of the arm and hand. In contrast, a study that assessed the circumferences of the upper limb, hand and arm, compared between the preoperative period and the 42nd postoperative day did not found differences, most likely due to the long period of reassessment.[30]

The perimeter found was lower 15 days after surgery with reduction of ROM in the Ass2; i.e., only in the immediate postoperative period. This is explained by the fact that 78% of the surgical techniques were not composed of more than one procedure, which preserves the area with temporary limitations. Literature data show that 28 women were assessed in the postoperative period of at least two months and the shoulder ROM was globally reduced.[31] Also, another study showed that 30 mastectomized women, 54.7 ± 9.2 years old, with a mean time between the surgery and the assessment of 10.43 ± 15.61 months, presented a ROM reduction, evaluated by biophotometry, in all shoulder movements, 130.3 degrees for abduction and 149.4 degrees for flexion, which are similar to the values found in Ass3, but below the normal range.[32] The surgical intervention on the BC alters the ROM of these movements, and the restriction to movement occurs due to dermal adhesion and pain, especially in cases with greater impairment, resulting in functional reduction.[32] However, muscle dysfunction is present in patients with BC, mainly related to sarcopenia and the type of treatment used. The reduction in upper limb muscle strength may be reduced by up to 12-16%, without substantial difference in shoulder muscle strength, but flexibility appears reduced when the procedure was radical mastectomy.[33]

This study presented some limitations, such as a reduced sample due to the clinical condition of the inpatients, and a limited access to the patients and to the procedures to be performed. The collection period was limited to the morning period, according to the department's availability and the unit's requirements.

Conclusion

This study aimed to analyze the musculoskeletal, cardiorespiratory, anthropometric and sensory functions of women who underwent surgical procedure for BC. The findings showed hemodynamic repercussions evidenced by the reduction in arterial blood pressure levels and respiratory repercussions. The reestablishment of these repercussions occurred in approximately 15 days. Musculoskeletal and sensory alterations also occurred in the recent postoperative period, evidenced by the reduction of the ROM of the scapular girdle and in the sensitivity threshold, mainly in the wound area. These findings from this specific sample are important for health professionals that deliver cares for this type of patient to be aware of and grounded on these repercussions, in order to avoid or minimize them and propose specific rehabilitation.

Authors´contributions

All the authors contributed substantially to the design of this manuscript and all approved the final version. IMOS, SRB, CG, MHDC e BM participated in the design, methodology, data analysis and interpretation, and writing of the article, while TTDB contributed to its critical review.

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Physiotherapy in obstetrics through the eyes of pregnant women: a qualitative study

Fisioterapia em obstetrícia pelos olhos das gestantes: um estudo qualitativo

Marina Joice Keil [1*]
Alexandre Magno Delgado [2]
Mikaela Aparecida de Oliveira Xavier [3]
Cassiane Merigo do Nascimento [4]

[1] Universidade Estadual do Centro-Oeste (UNICENTRO), Guarapuava, PR, Brazil
[2] Instituto de Medicina Integral Professor Fernando Figueira (IMIP), Recife, PE, Brazil
[3] Universidade Federal de Pernambuco (UFPE), Recife, PE, Brazil
[4] União de Ensino do Sudoeste do Paraná (UNISEP), Francisco Beltrão, PR, Brazil

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***Correspondence:** marinajkeil@gmail.com

Abstract

Introduction: Physiotherapy in women's health emerged with the aim of promoting and maintaining physical and emotional health from the beginning to the end of pregnancy, through preventive measures against possible injuries that may occur during pregnancy, childbirth and the postpartum. Access to knowledge about obstetric physiotherapy among pregnant women is increasing, which may contribute to a search for trained professionals. **Objective:** To analyze the perception of pregnant women about obstetric physiotherapy. **Methods:** This is a qualitative study carried out at the Materno Infantil Center, in Capanema, Parana state (PR), using a semistructured interview. Content analysis used the Bardin method to categorize the thematic axes. **Results:** Seven pregnant women aged between 18-24 years (57%), 23-32 weeks of gestation (42%), multiparous (71%), with secondary education (42%) and income between 1-3 monthly minimum wages (86 %) were included in the study. It was found that participants' perception of physiotherapy was inaccurate, because none of the women had accessed this treatment. The women stated that physiotherapists reduce labor pain, but they have no knowledge of how these professionals work in the postpartum. **Conclusion:** It is concluded that it is necessary to increase information on the contribution of physiotherapists during prenatal care, delivery and postpartum.

Keywords: Childbirth. Obstetrics. Physical therapy. Postpartum period. Prenatal.

Resumo

Introdução: *A fisioterapia em saúde da mulher é uma área que surgiu com o objetivo de promover e manter a saúde física e emocional do início ao final da gestação, exercendo um trabalho preventivo para os possíveis agravos que venham a ocorrer durante a gestação, parto e puerpério. O acesso ao conhecimento das gestantes sobre a atuação do fisioterapeuta na área de obstetrícia vem aumentando a cada dia e isso pode contribuir para uma procura por profissionais capacitados.* ***Objetivo:*** *Analisar a percepção das gestantes sobre a atuação da fisioterapia em obstetrícia.* ***Métodos:*** *Trata-se de um estudo com abordagem qualitativa, realizado no centro Materno Infantil, em Capanema, PR, configurado na forma de entrevista semiestruturada. Utilizou-se análise do conteúdo por meio do método de Bardin para categorizar os eixos temáticos.* ***Resultados:*** *Foram incluídas sete gestantes com idade entre 18 e 24 anos (57%), 23-32 semanas de gestação (42%), multigestas (71%), com ensino médio (42%) e renda de 1 a 3 salários mínimos (86%). Verificou-se que o contato com a fisioterapia é somente imaginável, porque nenhuma das participantes do estudo acessou esse desdobramento das políticas de saúde da mulher gestante. As gestantes afirmaram que o profissional de fisioterapia atua promovendo a diminuição da dor durante o trabalho de parto, porém não possuem conhecimento sobre como o fisioterapeuta atua no puerpério.* ***Conclusão:*** *Conclui-se que é necessário ampliar a informação sobre a atuação do fisioterapeuta durante o pré-natal, parto e pós-parto.*

Palavras-chave: *Parto. Obstetrícia. Fisioterapia. Período pós-parto. Pré-natal.*

Introduction

Obstetric physiotherapy is an area of women's health that emerged to promote and maintain physical and emotional health throughout pregnancy, through preventive measures against possible complications that may occur during pregnancy and after delivery.[1] This specialty was recognized in 2009 and regulated by the Federal Council of Physiotherapy and Occupational Therapy (COFFITO) in 2011.[2]

Physiotherapists have specific in-depth technical and scientific knowledge about women's health care that goes beyond merely reproductive issues, seeking to promote integrality and sociocultural aspects as a member of the health team.[3] In order to provide good care during all the phases of the pregnancy-puerperal cycle, physiotherapists require extensive scientific knowledge and health education, with an emphasis on health promotion.[4]

Prenatal, delivery and postpartum care is seen in a new light. Multidisciplinary childbirth preparation is characterized by psychosocial approaches to the couple. These procedures are becoming increasingly sought by women seeking a healthy pregnancy.[5] There is important scientific evidence.[1,3,6,7]

Despite all the evidence available in the literature, and although a few national studies have investigated this issue, women's knowledge about obstetric physiotherapy remains limited. Determining their knowledge about physiotherapy during pregnancy, delivery and the postpartum will prompt new health policies and demands that will help implement new behaviors, in addition to including more physiotherapists on maternity wards. Thus, the aim of the present study was to analyze pregnant women's perception of obstetric physiotherapy.

Methods

This is a qualitative study applying a semistructured interview about pregnant women's knowledge of obstetric physiotherapy. The study was approved by the Research Ethics Committee of União de Ensino do Sudoeste do Paraná (CAAE: 2991590618.1.00005230). Data were collected between August and September 2018. The following eligibility criteria were established: being pregnant, aged between 18 and 45 years and treated at the Child Maternal Center (Centro Materno Infantil - CMI) of Caranema, PR, which specializes in treating women, pregnant women and children.

The population consisted of seven pregnant women, obtained by the data saturation method. According to Fontanella et al.,[8] this method is used when the information provided by new participants adds little to the material already obtained, not contributing significantly to improving the theoretical framework based on the data being collected.

Initially, the pregnant women in the CMI were invited to participate in the study, followed by their providing informed consent. All the procedures were described, as well as the risks and discomforts, benefits and reliability

of the data. All the pregnant women that agreed to participate in the study met the eligibility criteria. The other women in the waiting room declined to take part. Next, socioeconomic, sociodemographic and clinical data were collected, as well as pregnancy characteristics.

The semistructured interview of the pregnant women was conducted using a voice recorder, asking the following questions: "do you have any knowledge of physiotherapy for pregnant women? Do you know what the physiotherapist does during the prenatal, delivery and postpartum?" The script for this type of interview aims at guiding the dialog and should be created to allow flexible conversations and absorb new topics and questions posed by the interviewer, providing a relevant framework during the interview. Thus, the language of the script should provoke several narratives of women's experiences to allow the interviewer to analyze and interpret the individuals' statements regarding their opinions and social relationships.[9]

After the interviews, the women were provided with guidelines and information on obstetric physiotherapy, in order to improve the quality of information, thereby broadening their knowledge.

Analysis and discussion of the data collected were carried out using the Bardin method,[9] a set of communication analysis techniques that uses systematic procedures and describes message content, where analysis of results is based on word association tests. The subjects' statements were then transcribed.

Results

The population consisted of seven pregnant women. To facilitate reading, a table was constructed to characterize the sample data (Table 1).

The guiding thematic area for the interviews was "physiotherapy through the eyes of pregnant women", identified in the key expressions contained in the main ideas of each statement. Next, equivalent, similar or complementary central ideas were included in a same category, sequentially organizing the content from more general to more specific ideas, using similar themes to determine the coherence between the parties and eliminate repetitive ideas. Each interview forms a singular unique but comparable whole, consisting of a dynamic, non-static discourse.

Table 1 - Personal and obstetric data of the pregnant women (n = 7)

Characteristics	%
Age (years)	
18 - 24	57
25 - 29	28
30 - 34	15
Pregnancy duration (weeks)	
3 - 12	28
13 - 22	-
23 - 32	42
33 - 42	30
Maternity class	
Primiparous	29
Multiparous	71
Schooling	
Secondary	42
Technical	28
Incomplete university	14
University graduate	14
Postgraduate	-
Income (minimum monthly wage)	
1 - 3	86
4 - 6	-
7 - 9	14

Physiotherapy through the eyes of the pregnant women

All the women reported never being treated by a physiotherapist. Affinities and anxieties were fractioned and synthetized by axes secondary to the principal axis, and fragmented based on the gestational cycle. When asked about their physiotherapy experiences in the prenatal, the pregnant women stated the following:

I believe that some types of physiotherapy exercises stimulate labor. (Pregnant woman 5)

I don't know if it has anything to do with it... Pilates, things like that… (Pregnant woman 7)

Well, I think it actually prepares the body, right? (Pregnant woman 1)

I'm not sure what the physiotherapist does, but I think they teach about a normal delivery to encourage us to select it… (Pregnant woman 2)

Ah, I think it helps... those who have a normal delivery… (Pregnant woman 4)

Ah, I think that... how should I say... it helps prepare us for labor and delivery... from feeling pain... to how to walk... relieving this pain... things like that… (Pregnant woman 6)

The pregnant women's experiences revealed that their perception of physiotherapy is inaccurate, because none of them has access to this health policy. In addition, there is a vague idea that physiotherapy would relieve pain, as will be discussed later.

With respect to the delivery process, the subjects were concerned about what to do to make it less painful. In terms of the role of physiotherapy, the women believe that physiotherapists act directly in diminishing pain during delivery.

(...) *You should help, you should know positions, something to help during the delivery, because... we know we will feel a lot of pain, but we don't know what to do, you don't know if you should crouch, walk or run, you have no idea (...) so this part is more concerning. That's my biggest concern. I know I'm going to feel a lot of pain, but I don't know what position to adopt during labor or what to do for relief when I`m having a lot of contractions? I have no idea because we just don't know what to expect, understand?* (Pregnant woman 1)

I think it could help us in a normal delivery, doing some kind of exercise that encourages the baby to come out faster… (Pregnant woman 5)

Look, I've never had physiotherapy... But I think breathing, preparing, ... and the position... I think all of this helps... I imagine that's it (...), I think that some exercises, dancing to relax ... some of us dance to relax... exercises help... we see that on Facebook… (Pregnant woman 6)

The interview ended in the postpartum, with the following recollections:

(...) *Actually, I think that if you prepare before, the recovery will be faster, but exactly what to do, I don't know*. (Pregnant woman 1)

In the postpartum... I don't know... I think with a normal delivery it's more like, how should I say... after the baby is born, you're already more relieved... I don't know... actually, I have no idea... (Pregnant woman 2)

Ah, I don't think so... I don't know, I have no knowledge... I have no idea. (Pregnant woman 7)

Discussion

Participants' perceptions were analytically distributed by highlighting the cognitive elements expressed in the statements, starting with the first question: access to physiotherapy, where all the women claim never to have undergone this treatment. In relation to obstetric physiotherapy, based on analysis of the women's statements, educational measures are recommended that focus on health promotion and prevention in the prenatal period, prescribing and applying analgesic physiotherapy resources and techniques during delivery, and implementing measures in the pre-delivery room, labor room, obstetric and postpartum ward, and providing help with breastfeeding.[2]

Analysis of the women's statements reveals their notion of the association between physiotherapy and physical exercises. Engaging in physical exercise during pregnancy is extremely important in promoting health, preventing complications and treating possible disorders caused by gestational adaptation.[10]

Obstetric physiotherapy is an incentive to active movement of a woman's body, which results in different positive effects for the mother and baby. Some of the benefits of physiotherapy during pregnancy are reduced lumbar pain, improved strength and muscle flexibility, less cardiovascular stress, assistance in weight control, lower risk of gestational diabetes, prevention of pelvic floor disorders, decline in urinary incontinence during pregnancy and postpartum, decreased perception of delivery pain, reduced swelling and cramps; and for the fetus, help in decreasing adiposity, increased tolerance to stress and exertion and help in advanced neurobehavioral maturation.[7,11-13]

Analysis of the statements shows that the women associated physiotherapy care with a vaginal delivery. During the prenatal, one of the physiotherapy's objectives is to prepare the woman's body for the delivery.[1,3] Preparation includes specific physical exercises for each gestational period, breathing and relaxation exercises and pelvic floor muscle training, in addition to orientation and postures to prevent and treat the possible pain and dysfunction caused by musculoskeletal, biomechanical, genitourinary, respiratory and cardiovascular adaptations. It is important to note that irrespective of the delivery type selected, physiotherapy plays an important role during the prenatal.[14-16]

The women's concern about labor pain (LP) and how to deal with this situation is quite relevant. It is

known that LP is a complex subjective physiological response to uterine contractions, that is, each woman in labor feels differently. It is also multifactorial, related to biopsychosocial factors. The physiotherapist is one of the professionals best equipped to treat women in labor, since they specialize in joint, muscle and biomechanical movements and study non-pharmacological methods to relieve delivery pain.[7,17-21]

The non-pharmacological methods with the best scientific evidence of pain relief are massages, transcutaneous electrical nerve stimulation (TENS), acupuncture, thermotherapy, continuous support during LP, breathing exercises and kinesiotherapy with postures and pelvic movements that help the baby drop.[7,13,20-22]

The lack of knowledge about which postures to use during labor highlights the importance of physiotherapy during the prenatal. By demonstrating and explaining the benefit of each posture and exercise and how they function, pregnant women can select them according to their needs and the physiotherapist's assessment of their obstetric condition.[1,3]

In the postpartum, physiotherapy acts in the recovery, prevention and treatment of pregnancy-related changes, in addition to providing orientation regarding adequate breastfeeding positions, reeducating the respiratory function, encouraging postural alignment, stimulating the circulatory and intestinal systems, thereby relieving the discomforts caused by the delivery, reeducating pelvic floor muscles, promoting early walking, treating abdominal diastasis and other musculoskeletal changes that women experience.[1,3,23,24]

NIn Brazil, obstetric physiotherapy has gained increasing prominence. The Brazilian Association of Physiotherapy in Women's Health (ABRAFISM) held a campaign called "For More Physiotherapists in Maternity Wards", aimed at providing physiotherapists, professional boards and associations, and health administrators with information related to the campaign, by disseminating the role of physiotherapy in maternity wards, and contributing to expanding it in high-quality obstetric physiotherapy facilities, in line with the precepts of obstetric humanization and teamwork, in order to provide excellent obstetric care in pregnancy, delivery and the postpartum. Piauí state instituted the first law that made physiotherapists mandatory in public and private maternity wards, a significant achievement that guarantees quality care for pregnant women, those in labor and in the postpartum.[25]

For these reasons, the experiences described in the study are likely responsible for the inaccurate perception of physiotherapy as being solely associated with physical exercises, while in fact it can provide benefits during pregnancy, delivery and postpartum.

Conclusion

It was concluded that the women's statements demonstrate the need to provide more information on physiotherapy during the prenatal, delivery and postpartum. Understanding the knowledge of pregnant women about obstetric physiotherapy allows reflection on the current physiotherapy conduct and protocols, in addition to favoring the development of public policies based on good scientific evidence, with a positive impact on public health.

Authors' contributions

MJK, CMN and AMD designed the study. MJK recruited and interviewed the participants. MAOX reviewed the manuscript, and all the authors approved the final version.

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Intrauterine balloon tamponade for postpartum hemorrhage

Tamponamento por balão intrauterino no tratamento da hemorragia pós-parto

Michel Marcos Dalmedico [1*]
Felipe Mendes Barbosa [2]
Caroline Machado de Toledo [2]
Waleska Alves Martins [2]
Angela do Rocio Fedalto [2]
Sergio Ossamu Ioshii [1]

[1] Pontifícia Universidade Católica do Paraná (PUCPR), Curitiba, PR, Brazil
[2] Universidade Positivo (UP), Curitiba, PR, Brazil

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Associate editor: Maria Augusta Heim

*** Correspondence:** micheldalmedico@yahoo.com.br

Abstract

Introduction: Postpartum hemorrhage is an obstetric emergency with high prevalence and significant morbidity and mortality, especially in areas with reduced access to specialized health services. **Objective:** To evaluate the effectiveness of intrauterine balloon tamponade in controlling postpartum hemorrhage, with the aim to reduce the need for emergency surgical interventions and decrease maternal mortality. **Methods:** A systematic review of randomized clinical trials, guided by the Cochrane Handbook for Systematic Reviews of Interventions and reported through the Preferred Reporting Items for Systematic Reviews and Meta-Analyses. Randomized clinical trials that evaluated the use of different types of balloons for intrauterine tamponade as a strategy for reducing or stopping postpartum hemorrhage compared to other interventions (pharmacological or surgical) were considered for inclusion. **Results:** Four studies evaluated 498 patients. In 80% of the reported cases, hemorrhage cessation was observed within a mean interval of 15 min after device insertion. The device permanence time was 24 h. No serious adverse events were reported. Due to clinical heterogeneity between studies, it was not possible to perform a quantitative synthesis. **Conclusion:** We did not find enough evidence to support the routine use of uterine tamponade devices as a protocol practice in the control of refractory postpartum hemorrhage. However, the use of these devices seems to be promising in cases where first line interventions fail and may play an important role in decreasing maternal morbidity and mortality and in uterine preservation.

Keywords: Evidence-based emergency medicine. Postpartum hemorrhage. Systematic review. Uterine balloon tamponade.

Abstract

Introdução: *A hemorragia pós-parto trata-se de uma emergência obstétrica com elevada prevalência e morbimortalidade significativa, sobretudo em contextos de baixa acessibilidade a serviços especializados de saúde.* ***Objetivo:*** *Avaliar a efetividade do tamponamento por balão intrauterino no controle da hemorragia pós-parto, redução da necessidade de intervenções cirúrgicas de emergência e redução da mortalidade materna.* ***Métodos:*** *Revisão sistemática de ensaios clínicos randomizados, orientada pelo* Cochrane Handbook for Systematic Reviews of Interventions *e relatada através do* Preferred Reporting Items for Systematic Reviews and Meta-Analyses*. Foram considerados como critérios de elegibilidade ensaios clínicos randomizados que avaliaram o uso de diferentes tipos de balão para tamponamento intrauterino enquanto estratégia para a redução ou cessação da hemorragia pós-parto quando comparados a outras intervenções (farmacológicas ou cirúrgicas).* ***Resultados:*** *Quatro estudos avaliaram 498 pacientes para os desfechos preconizados. Em 80% dos casos relatados observou-se a cessação da hemorragia em um intervalo médio de 15 minutos, após a inserção dos dispositivos. O tempo de permanência dos dispositivos foi de 24 horas. Não foram relatados eventos adversos graves. Devido à heterogeneidade clínica entre os estudos, não foi possível realizar síntese quantitativa.* ***Conclusão:*** *Os achados obtidos não fornecem evidências suficientes para sustentar a utilização rotineira dos dispositivos de tamponamento uterino enquanto prática protocolar no controle da hemorragia pós-parto refratária. A utilização destes dispositivos, no entanto, parece ser promissora diante da falha das intervenções de primeira linha, podendo desempenhar um importante papel em termos de redução de morbimortalidade materna e preservação uterina.*

Palavras-chave: *Medicina de emergência baseada em evidências. Hemorragia pós-parto. Revisão sistemática. Tamponamento com balão uterino.*

Introduction

Postpartum hemorrhage is defined as an obstetric emergency caused by excessive and/or cumulative blood loss (greater than 1,000 mL) within 24 hours (primary or early) or after this period (secondary) due to uterine atony or failure of the uterus to contract and retract after the child is born, regardless of the mode of delivery, resulting in signs and symptoms of hypovolemia and hemorrhagic shock.[1-4]

This condition is one of the most common complications in clinical obstetric practice, notably in its most severe form (hemorrhage > 1,500 mL), accounting for about 30% of maternal deaths. It requires immediate recognition and management to avoid significant morbidity and mortality.[4,5] The prevalence of this complication is disproportionately higher in resource-poor settings, in which obstetric surgical capacity, emergency transport, and the supply of blood components are limited.[1,3]

In addition to death, severe adverse events resulting from postpartum hemorrhage include hypovolemic shock, acute respiratory distress syndrome, disseminated intravascular coagulation, dilutional coagulopathy secondary to fluid resuscitation, and infertility due to the need for emergency peripartum hysterectomy.[2,6]

A study with more than 154,000 births in primiparous women reported 666 cases (0.4%) that progressed to hemorrhagic conditions.[7] Factors significantly associated with hemorrhage were placental retention, inability to progress during the second stage of labor, morbidly adherent placenta, tract lacerations, use of forceps, macrosomia (> 4,000 g), hypertensive diseases during pregnancy, induction of labor, prolonged labor, and first or second stage of labor.[7]

Despite the identification of many characteristics associated with postpartum hemorrhage, most parturients with significant hemorrhage present no recognizable risk factors. Due to the inability to reliably predict patients at high risk for obstetric hemorrhage, all parturients should be considered susceptible.[8]

The first line of treatment for postpartum hemorrhage involves the use of uterotonic pharmacological agents (oxytocin, ergometrine, and misoprostol),[9,10] and/or drugs that act on blood clotting (tranexamic acid).[11] It is noteworthy that 10 to 20% of patients do not respond to these interventions (a subgroup called refractory postpartum hemorrhage), where most of the morbidity and mortality related to postpartum hemorrhage is concentrated.[6]

In cases that are refractory to conventional treatment, intrauterine arterial compression measures are necessary. Second-line interventions include the use of intrauterine tamponade with a balloon or gauze and uterine compression sutures. If these therapies do not stop the hemorrhage, patients may undergo radiological

uterine artery embolization, pelvic devascularization, or hysterectomy.[12]

In this context, intrauterine balloon tamponade is a non-surgical intervention (conservative treatment) that is less invasive, easy to apply, and can adequately control the hemorrhagic condition (success rate greater than 85% in cases refractory to conventional treatment).[13-15] Their use can avoid hemorrhagic shock and the use of more complex surgical techniques that often aggravate the clinical condition, such as hysterectomy and bilateral ligation of the internal iliac arteries.[16,17]

The characteristics of uterine tamponade include low operating cost, easy insertion into the cervix or using a surgical incision through hysterotomy, low displacement rate, minimal training, adequate conformability to the hemorrhagic area, and the possibility of monitoring blood loss through the drainage lumen.[16-19]

This review aimed to evaluate the effectiveness of intrauterine balloon tamponade for the treatment of postpartum hemorrhage, which could reduce the need for emergency surgical interventions and decrease maternal mortality.

Methods

A systematic review of randomized clinical trials, contemplating the steps contained in the Handbook for Systematic Reviews of Interventions (Version 6.2)[20] and reported through the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was conducted.[21] This review was registered on the International Prospective Register of Systematic Reviews (PROSPERO; registration number: CRD42019135960).

Systematic reviews consist of a secondary study, delineated from a defined research question, that seek to provide a robust overview of the effectiveness of an intervention, problem, or research field. The methodological structure includes: question formulation; study location and selection; critical evaluation of studies; data collection; data analysis and presentation; and data interpretation.[20]

The detailed specification of the review question requires the consideration of several key components that can be encompassed by the mnemonic PICO (population/problem, intervention, comparison, and outcome). Thus, the following question was formulated: how effective are different intrauterine balloon tamponade technologies in controlling postpartum hemorrhage (primary or secondary) compared to conventional treatments for the following: hemorrhage cessation, need for surgical interventions, and maternal mortality?

Randomized clinical trials that evaluated the use of different types of balloons for intrauterine tamponade as a strategy for reducing or stopping postpartum hemorrhage compared to other interventions (pharmacological or surgical) were considered for inclusion.

There were no restrictions regarding the publication date, sample size, and publication language. The exclusion criteria were studies with another methodological design, or that described the use of other hemorrhagic control strategies or the use of uterine tamponade devices in post-abortion obstetric hemorrhage, traumatic conditions, and prepartum.

To identify the relevant studies, a systematic search was conducted in the PubMed/MEDLINE, Web of Science, and Cochrane Central Register of Controlled Trials (CENTRAL) databases using the Medical Subject Headings (MeSH terms): postpartum hemorrhage and intrauterine balloon tamponade. The combination of descriptors and their synonyms was achieved through the use of Boolean operators represented by the connectors AND (restrictive combination) and OR (additive combination) and the truncation symbols "*" (Cochrane and PubMed) and "$" (Web of Science), which identify singular or plural words and linguistic variations for the same descriptor (Table 1).

A manual search for gray literature was also performed in the ClinicalTrials.gov database (US National Library of Medicine). Furthermore, the reference lists of the retrieved clinical trials were searched to identify potentially eligible studies that were not otherwise found using the above search strategy.

Two reviewers performed the search independently. Each reviewer selected potentially eligible studies using the inclusion criteria. The two lists obtained were compared, and in case of differences (for the inclusion or exclusion of studies), a third reviewer participated in the decision-making process.

From the list of included studies, each clinical trial was scrutinized by the two reviewers, who determined the internal validity and collected qualitative data (authors, year of publication, country of origin, journal, and publication database) and clinical data (total

number of participants, distribution of subjects in the control and intervention arms, number of subjects, and type of intervention) as well as data on the segment time, segment loss, analyzed outcomes, and adverse events.

The level of agreement between reviewers regarding the inclusion or exclusion of studies was determined by the Kappa measurement. Internal validity was determined using the Cochrane Collaboration tool to assess the risk of bias of randomized clinical trials (risk of bias tool), available in Review Manager (version 5.3).[22]

Table 1 - Search strategy and databases

Databases	Keywords
Pubmed MEDLINE	(((((((("uterine compression"[Title/Abstract] OR "uterine compression"[All Fields]) OR "postpartum balloon"[Title/Abstract]) OR "postpartum balloon"[All Fields]) OR "intrauterine balloon tamponade"[Title/Abstract]) OR "intrauterine balloon tamponade"[All Fields]) OR "bakri balloon"[Title/Abstract]) OR "bakri balloon"[All Fields]) AND "postpartum h*emorrhage"[Title/Abstract]) OR "postpartum h*emorrhage"[All Fields] AND ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading])
Web of Science	(("postpartum hemorrhage") AND ("intrauterine balloon tamponade" OR "uterine compression" OR "postpartum balloon" OR "Bakri balloon")) AND TOPIC: ((trial))
Cochrane CENTRAL	SEARCH #1: "uterine compression*":ti,ab,kw SEARCH #2: "postpartum balloon":ti,ab,kw SEARCH #3: "intrauterine balloon tamponade": ti,ab,kw SEARCH #4: "bakri balloon":ti,ab,kw SEARCH #5: "postpartum h*emorrhage":ti,ab,kw SEARCH #6: (#1 OR #2 OR #3 OR #4) AND #5

In this evaluation, the data from the studies were judged for the following domains: selection bias (generation of the randomization sequence), performance bias (blinding of participants and professionals), reporting bias (selective outcome report), attrition bias (incomplete outcomes), and detection bias (blinding of outcome evaluators). The domains were classified as "low risk of bias," "high risk of bias", and "undetermined risk of bias".

The included studies were also classified according to the allocation concealment defined by the Cochrane Handbook (6.2). Category A: appropriately described allocation process. Category B: although the allocation process has not been described, the study points to randomization. Category C: allocation concealment was conducted inappropriately. Category D: there was no evidence of randomization.

In addition, the checklist of the Template for Intervention Description and Replication (TIDieR) was used. TIDieR is a tool designed to improve the description of interventions in randomized clinical trials by establishing standards for reporting these procedures, which includes the identification of the type of intervention to facilitate the link with similar reports, clinical indication, rational justification for the technology under study, complete description of materials, execution protocol, and information about the intervener, method of intervention delivery, characteristics or circumstances of the place of performance, dose, and scheduled use.[23] Other elements covered are the report of adaptations and modifications during the process, if they occurred, adherence of the researcher or participant in the integrity of the treatment, and evaluation of the intervention performed.[23]

There are no funding sources or conflicts of interest to declare in relation to this systematic review.

Results

The literature search resulted in the retrieval of 973 studies (Figure 1). The results agreement by the Kappa index was 0.166 (p = 0.022, CI95%).

Of the studies excluded in the second screening, 12 analyzed other obstetric conditions that resulted in hemorrhagic events, and 17 explored other interventions for the treatment of obstetric hemorrhage.

The internal validation of the four studies included a risk of bias assessment for the selection, performance, detection, attrition, and reporting domains. The reviewers' judgment for each domain made it possible to infer the general methodological quality of each study (Figure 2). The inter-rater agreement (Kappa) for the individual classification of domains was 0.573 (p < 0.001, CI95%).

All selected studies were classified as having a low risk of selection bias and used allocation methods such as a lottery[24,25] and computer-generated random sequence.[26,27]

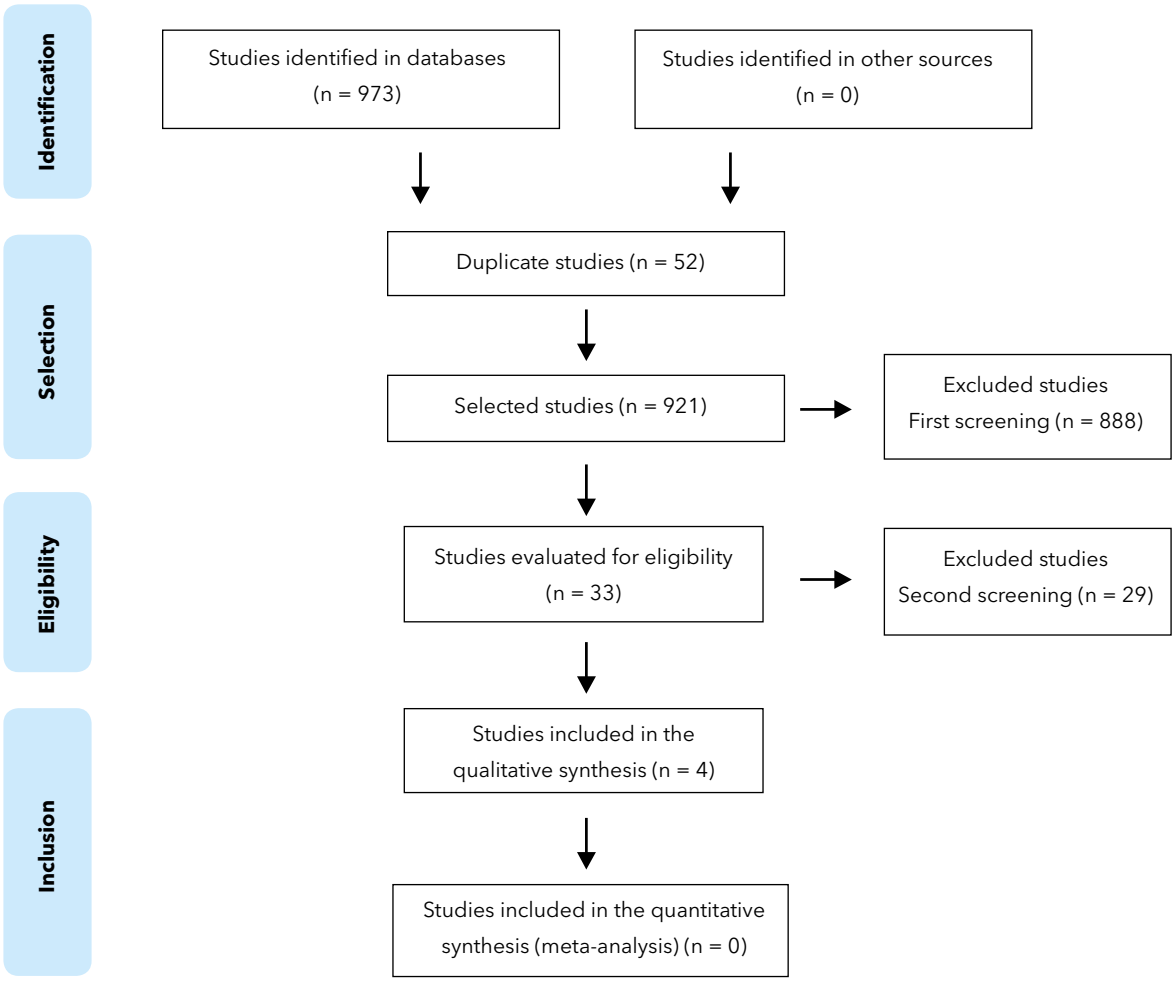

Figure 1 - PRISMA flowchart with the phases of the systematic review. Review Manager version 5.3.

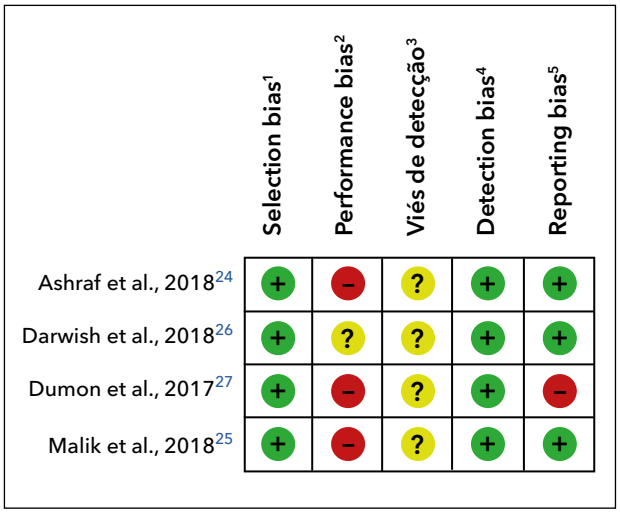

Figure 2 - Bias risk summary. Review Manager 5.3., 2021.

Note: [1]Allocation concealment; [2]Blinding of participants and personnel; [3]Blinding of outcome assessment; [4]Incomplete outcome data; [5]Selective reporting. + Low risk of bias – High risk of bias ? Undetermined risk of bias.

Significant clinical heterogeneity was present in 75% of the studies, resulting in a high risk of performance bias. No study showed significant segment losses in the treatment and control groups or disproportionately distributed participants between the intervention and control groups.

Despite the non-compliance with selective reporting of results, one study received funding and was therefore classified as having a high risk of reporting bias.[27] Nevertheless, the funding of this study by the United

Nations Children's Fund was justified due to the limited resources available where the study was conducted.

The critical evaluation of the studies for allocation concealment showed that four trials were classified as category A, as they adequately described the allocation process.

The evaluation of the quality of the intervention report found that all of the clinical trials described the intervention and scientific basis for its use. Only one study did not provide details of the materials used in the intervention.[24] Two studies detailed the execution of the intervention,[26,27] while one did not provide enough descriptive data.[24] None of the studies provided enough information about the intervener's skills.

All interventions were conducted in a hospital environment due to the characteristics of the studied problem. The patients received the intervention only once, with variations in the insufflation volume of the devices and in their permanence time. Intervention modifications or adaptations were not mentioned due to the individual conditions of patients. The studies did not discriminate the assessment of the fidelity of the studied interventions.

A list of the selected studies with their respective references, authors, year of publication, title, and journal/base is presented in Table 2. The clinical data, including the number of participants, intervention and control arm, main evaluated outcomes, and adverse events, are summarized in Table 3.

Table 2 - Narrative synthesis of the general data of the studies

Author/Year	Country	Title	Journal/Database
Dumont et al., 2017[27]	France	Uterine balloon tamponade as an adjunct to misoprostol for the treatment of uncontrolled postpartum haemorrhage: a randomised controlled trial in Benin and Mali	BMJ Open/Pubmed
Ashraf et al., 2018[24]	Pakistan	Efficacy and safety of intrauterine balloon tamponade versus uterovaginal roll gauze packing in patient presenting with primary postpartum hemorrhage after normal vaginal delivery	Annals of King Edward Medical University/Web of Science
Darwish et al., 2018[26]	Egypt	Bakri balloon versus condom-loaded Foley's catheter for treatment of atonic postpartum hemorrhage secondary to vaginal delivery: a randomized controlled trial	J Matern Fetal Neonatal Med/ Pubmed
Malik et al., 2018[25]	Pakistan	Comparison of intrauterine balloon tamponade and B Lynch suture in severe postpartum hemorhage	Pak Armed Forces Med J/ Web of Science

Table 3 - Narrative synthesis of the clinical data from the included studies

Study	Intervention group	Control group	Main outcomes
Dumont et al., 2017[27]	Handmade intrauterine balloon closure: male condom adapted to Foley catheter associated with Misoprostol (n = 57)	Rectal and sublingual misoprostol (n = 59)	The proportion of women who needed interventions (arterial ligatures, uterine compression, sutures, hysterectomy) did not differ between the intervention (16%, 9/57) and control groups (7%, 4/59). The mortality rate was higher in the intervention group (10%, 6/57) than in the control group (2%, 1/59) (p = 0.059).
Ashraf et al., 2018[24]	Handmade intrauterine balloon tamponade: male condom adapted to a Foley catheter (n = 106)	Uterine tamponade with gauze pads	In the intervention group, treatment was effective in 82 (77.4%) cases, while in the control group, treatment was effective in 63 cases (59.4%).
Darwish et al., 2018[26]	Bakri balloon (n = 33)	Handmade intrauterine balloon tamponade: male condom adapted to Foley catheter (n = 33)	The Bakri balloon was effective in 91% of cases compared to 85% of patients in the control group.
Malik et al., 2018[25]	Balloon tamponade with four Foley catheters (number 24) inserted simultaneously (n = 52)	B-Lynch compressive sutures (n = 52)	The success rate of the B-Lynch suture was 88.46% compared to intrauterine balloon tamponade (67.31%).

Discussion

A total of 498 patients from four randomized clinical trials were included in this review. The included studies used different tamponade techniques, such as the Bakri balloon,[26] a product specifically designed to control postpartum uterine bleeding, a handmade system consisting of a male condom adapted to a Foley catheteor preservativo masculino adaptado ao cateter Foley,[24,26,27] and simultaneous insertion of four Foley probes.[25]

The overall success rate was 80% within about 15 min after the intervention. The mean volume of saline solution used to fill the different devices ranged between 400 and 500 mL. After the cessation of the hemorrhagic condition, the permanence time of the balloons varied between 4 and 24 h. No adverse events were reported.

One of the tests compared the Bakri balloon and handmade tamponade technique. The time required for hemorrhagic control (between device insertion and hemorrhage cessation) was shorter in the Bakri group than in the control group (9.09 and 11.76 min, respectively.[26] One of the limitations of condoms is that they do not support insufflation with volumes greater than 250 to 300 mL, causing the device to break. Furthermore, its texture does not allow for adequate compression of the uterine cavity.[28]

Blood loss estimation was performed visually,[27] through clinical evidence of a changed hemodynamic status (blood pressure and heart rate),[26] and amount of blood-saturated swabs.[24,25] Intervention failure was defined as the persistence of hemorrhage 15 min after the insertion and inflation of the artifact, or as balloon displacement with the need for additional interventions to control the hemorrhage. Intervention failure was observed in 58 cases (20%), in which the patients underwent procedures such as uterine artery ligation, uterine compression, B-Lynch suture, or hysterectomy. Two trials did not describe the interventions used for hemorrhagic control after the failure of uterine tamponade devices.[24,25]

Only one of the studies cited maternal mortality as a secondary outcome. The reported mortality was higher in the intervention group but, of the six patients who died, four did not actually undergo the intervention.[27]

A systematic review of non-randomized studies evaluating the use of different intracavitary uterine tamponade devices, including a condom catheter (ESM-UBT), Foley catheter, and Sengstaken-Blakemore esophageal tube in settings with few medical resources demonstrated success in controlling postpartum hemorrhage in 234 of the 241 patients evaluated.[18]

These findings corroborate a meta-analysis that evaluated studies with different designs. The overall success rate of uterine balloon tamponade was 85.9% (CI95%, 83.9-87.9%). Hemorrhage control was lower in cesarean deliveries (81.7%) compared to vaginal deliveries (87%). The frequency of complications attributed to the use of uterine balloon tamponade was low (≤ 6.5%).[29] It is noteworthy that the main findings described come from observational studies.

A retrospective cohort study of 72,529 women who delivered between 2011 and 2012 in 19 French maternity hospitals and were allocated to either a pilot group (balloon tamponade) or control group was reviewed. Invasive procedures (pelvic vessel ligation, arterial embolization, hysterectomy) were used in 298 women (4.1/1,000 deliveries, CI95% 3.7-4.6). The proportion of patients that underwent at least one invasive procedure was significantly lower in the pilot group (3.0/1,000 versus 5.1/1,000, $p < 0.01$). Of the women who had a vaginal delivery, the use of arterial embolization was also lower in the intervention group (0.2/1,000 versus 3.7/1,000, $p < 0.01$), as well as in those who had a cesarean section (1.3/1,000 versus 5.7/1,000, $p < 0.01$).[30]

In a case series of 163 women with refractory hemorrhage, 160 (98%) survived after the insertion of a uterine balloon.[31] The early implantation of these devices reduced the number of fatalities and the rate of hysterectomy in obstetric patients, both in primiparous and multiparous women with postpartum hemorrhage who did not respond to uterotonic drug treatment.[32] A decreased mortality rate was also observed when the devices were installed during the progression to shock conditions.[33]

Although the use of intrauterine balloon tamponade in patients with postpartum hemorrhage primarily aims to control the hemorrhage, this intervention is also considered to be "uterus sparing" and has been shown to affect menstrual outcomes, fertility, and future pregnancies minimally.[34,35]

Although the overall success rate reported in observational studies and clinical trials is significant, it is necessary to consider the predictors of intervention failure. Variables such as obesity, multiple pregnancies,

cesarean delivery, previous curettage, prolonged surgery, and placenta accreta spectrum have been identified as independent risk factors associated with uterine tamponade failure.[36,37]

Conclusion

We did not find enough evidence on the clinical effectiveness of uterine tamponade devices to recommend their use as a protocol practice in the treatment of patients with refractory atonic obstetric hemorrhage. The low methodological quality of the clinical trials included and the challenges in synthesizing and grading evidence from different types of studies due to clinical heterogeneity represent important obstacles in obtaining robust and reproducible evidence.

However, the use of an intrauterine balloon (including handmade methods) to control postpartum hemorrhages seems to be promising in cases with conventional pharmacological therapy failure. Furthermore, it is a conservative strategy that should precede surgical interventions. Intrauterine balloons could help decrease maternal morbidity and mortality and preserve fertility, especially in areas with limited access to specialized health services.

Prospective, multicentric, large-scale studies with better methodological quality need to be conducted in the future to achieve advances in obstetric clinical practice. In addition, the use of TIDieR is recommended for future studies as this would enable better study reproducibility in different contexts and result validation.

Authors' contribution

MMD: research project design, general orientation, manuscript writing, third reviewer. FMB: manuscript writing, search strategy, first reviewer, search strategy development, and execution. CMT: review and final writing, complementary searches, support with methodology (Cochrane Handbook). WAM: manuscript writing, search strategy, second reviewer, search strategy development, and execution. ARF: support with methodology (Cochrane Handbook, PRISMA, Review Manager, risk of bias tool, translation). SOI: review, final writing, and academic support.

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