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ORIGINAL ARTICLE

Lower urinary tract symptoms and perineal function in women with and without fibromyalgia: a cross-sectional study

Hellen Cristina Souza de Carvalho Fusco[1] · Marco Antônio Gonçalves Pontes Filho[2] · Jorge Milhem Haddad[3] · Míriam Raquel Diniz Zanetti[4] · Amélia Pasqual Marques[1] · Elizabeth Alves Gonçalves Ferreira[1]

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Abstract

Introduction and hypothesis Fibromyalgia (FM) studies have focused on pain, but a 2010 review of the diagnostic criteria pointed to other symptoms including urinary incontinence (UI). Women with FM present pain, fatigue, and reduced muscle strength; the research hypothesis was that pelvic floor (PF) muscles would be weaker; therefore, FM could be associated with lower urinary tract symptoms (LUTS) and compromise quality of life (QoL). The aim of this paper was to compare PF function, urinary symptoms, and their impact on QoL in women with and without FM and to verify if there is association between FM and LUTS.

Methods We performed a cross-sectional study with 126 sexually active women aged between 19 and 65 years old, distributed in two groups, women with FM (FG $n = 62$) and without FM (NFG $n = 64$). Perineal function was the primary outcome and was assessed by perineometry and bidigital vaginal palpation (PERFECT Scheme). Presence of LUTS was assessed by interview based on international definition, and the impact of UI on QoL was evaluated by the King's Health Questionnaire (KHQ).

Results FG presented worse PF function on clinical exam ($p < 0.001$) and perineometry ($p = 0.04$). LUTS was more frequent among FG ($p < 0.001$). In terms of QoL, FG obtained lower KHQ scores for general health perception ($p < 0.001$) and sleep/energy ($p < 0.003$) domains. The odds of presenting LUTS is 5.03 (95%CI 2.35–10.75) higher in women with FM.

Conclusion Women with FM had worse perineal function, had more LUTS, and presented UI more frequently, which negatively impacts on QoL.

Keywords Fibromyalgia · Pelvic floor · Quality of life · Urinary incontinence

Introduction

In 1990, the American College of Rheumatology defined the following criteria for diagnosing fibromyalgia (FM): chronic and widespread pain of musculoskeletal origin in the four quadrants and axial skeleton associated with the presence of 11 of the 18 tender points [1]. Previous studies on FM have traditionally focused on pain, but a 2010 review of diagnostic criteria pointed to the importance of other symptoms besides musculoskeletal pain, defining FM as a chronic painful syndrome that presents widespread pain frequently associated with sleep disorders, fatigue, and somatic and cognitive symptoms [2, 3].

Pelvic floor (PF) dysfunction negatively affects intestinal, urinary, and sexual function, greatly affecting women's quality of life [4]. Even though PF dysfunction is known for its high prevalence and negative effects on women's health, there are few studies that address the relationship between urinary symptoms and FM [5, 6]. Those studies applied specific questionnaires, such the Pelvic Organ Prolapse Quantification System (POP-Q), which measures genital organ prolapse, or urodynamic study, but not PF functional assessment [5, 7].

Women with FM present pain, fatigue, and reduced muscle strength [1–3]. The research hypothesis was that PF muscles would be weaker in women with FM; therefore, it could be associated with lower urinary tract symptoms (LUTS).

✉ Hellen Cristina Souza de Carvalho Fusco
hellenfusco@gmail.com

[1] Department of Physiotherapy, Speech Therapy and Occupational Therapy, Faculty of Medicine, University of São Paulo, Rua Cipotânea, 51, Cidade Universitária, São Paulo, Brazil

[2] Department of Rheumatology, Hospital das Clínicas, Faculty of Medicine, University of São Paulo, São Paulo, Brazil

[3] Department of Obstetrics and Gynecology, Faculty of Medicine, University of São Paulo, São Paulo, Brazil

[4] Department of Human Movement Sciences, Federal University of São Paulo (UNIFESP), São Paulo, Brazil

Urinary incontinence (UI) is one of the most frequent LUTS and may compromise quality of life.

The objectives of the present study were to compare perineal function and LUTS of women with and without FM, to assess the impact of UI on quality of life and to verify if there is association between the presence of LUTS and FM.

Material and methods

Design

This was a cross-sectional study with 126 women distributed in two groups, one group with 62 women diagnosed with FM (FG) and one group of 64 women that were not (NFG). The sample size was calculated using intravaginal pressure (perineometry) as the main outcome. It was used estimated standard deviation of 17.9%, according to previous studies, confidence level of 90% and power of 70%. The calculated sample size was 124 women in total and 62 women with diagnosis of FM.

Participants, therapists, centers

Data were collected between March 2015 and October 2016 at the outpatient Physical Therapy Department and the Rheumatology Clinic of a teaching hospital.

The Ethics Committee for Analysis of Research Projects - CAPPesq approved this study, under the number 40789914.1.0000.0065. All participants gave written informed consent before data collection began.

The inclusion criteria were women with and without diagnosis of FM, aged between 19 and 65 years old and able of responding to questionnaires and following instructions. Pregnant women, women who were not yet sexually active, who presented neurological disorders or sequelae, had sexually transmittable infections, or took medication that could cause urinary leakage or retention as side effects were excluded.

The diagnosis of FM was based on the 2010 American College of Rheumatology (ACR) criteria. The classification depends on the score of widespread pain index (WPI), severity scale (SS), and continuing symptoms for more than 3 months. The WPI and SS were applied by rheumatologists at the Rheumatology outpatient clinic, and laboratory tests were used to exclude other diseases that could explain the symptoms. Women who received the diagnosis of FM and who fit the study inclusion criteria were invited to participate.

Women who fit inclusion criteria and did not present diagnosis of FM were recruited from several sites, such as churches, people who accompanied patients, and employees who worked at the Rheumatology outpatient clinic.

Outcome measures

The primary outcome of the study was perineal function, which was assessed by perineometry (Peritron) and bidigital vaginal palpation (PERFECT Scheme). The PERFECT Scheme measures power (scored according to the Oxford Grading Scale), endurance, repetitions, and speed of PF muscle contractions. The urinary symptoms were collected by interviewing patients. The impact of UI on quality of life was evaluated by King Health Questionnaire (KHQ).

Assessment of PF function was conducted in two stages. First, assessment was carried out using the PERFECT Scheme, conducted with the patient in gynecological position with feet supported and using bidigital palpation to assess muscle contraction in terms of intensity (*P*—power), time of sustained contraction (*E*—endurance), repetition of sustained contraction (*R*—repetition), and fast contractions (*F*—fast) [8].

Before testing PF function, participants were asked to contract their PF muscles, while the evaluator performed vaginal palpation. The objective was to verify whether contractions were performed adequately and if the verbal instructions were understood correctly. Contractions performed in association with hip retroversion or Valsalva maneuver were considered inadequate [9, 10].

Perineometry was performed using the Peritron device (Cardio Design Pty. Ltd. Castle Hill, Australia) which measures the increase in intravaginal squeeze pressure, in cmH_2O, during voluntary PF muscle contraction, in cmH_2O. The evaluator introduced the sensor so that about 1 cm remained outside the vaginal introitus; the sensor was insufflated to 100 cmH_2O. The display was zeroed for calibration according to the manufacturer's instructions. Participants were asked to perform three maximum muscular contractions with a 30-s interval between, and only contractions in which the evaluator could visualize the sensor's cranial displacement were considered valid. The mean of the three peak contraction values was considered for statistical analysis.

The assessment of LUTS was based on the definition proposed by the International Urogynecological Association (IUGA) and the International Continence Society (ICS) [11].

The KHQ was applied to women who reported urinary leakage, with the aim of assessing the impact of UI on quality of life, considering nine domains: general health perception, incontinence impact, role limitations, physical limitations, social limitations, personal relationships, emotions, sleep/energy, and severity of symptoms. Each domain is scored separately: The higher the score, the worse the quality of life regarding that domain [12]. Considering the educational level of the sample, the questionnaire was applied in the form of an interview.

Data were gathered in one session by the same evaluator, who was experienced in PF assessment.

Data analysis

Descriptive statistics was performed: median, first quartile, and third quartile or mean and standard deviation were calculated for quantitative variables, and frequency (absolute and relative) for categorical variables. The Shapiro-Wilk test was used to test for the normal distribution hypothesis.

The Pearson's chi-square test was employed to verify association between categories and, when necessary, the Fisher's exact test was applied. The Wilcoxon-Mann-Whitney test was used for quantitative variables with non-normal distribution, and the *t* test was used for normal distribution. Considering that the vaginal palpation test for PF strength contains a subjective aspect, this variable was correlated with the perineometry test (an objective result that is independent from the evaluator's interpretation) using Spearman's nonparametric test.

Logistic regression was conducted to verify association between the presence of lower urinary tract symptoms (dependent variable) and FM (independent variable). A model of stepwise forward multiple regression was performed aiming to test which factors (age, presence of FM, smoking, alcoholism, number of pregnancies, presence of menopause, number of vaginal deliveries) were associated with the presence of LUTS. R version 3.3.2 for Windows and SigmaStat 4.0 software were used. A 5% level of significance ($p < 0.05$) was adopted.

Results

A total of 126 women were evaluated and two women with FM were excluded, one due to the use of Amitriptyline and the other because of neurological sequelae. The mean age was 46 (± 10.07) years old for FG and 42 (± 10.27) years old for NFG ($p = 0.004$). Most women were married (57.8%) and 50% had children (one or two). There was no difference between groups in terms of age of menarche, which occurred between 12 and 13 years of age ($p = 0.7$), and menopausal status ($p = 0.156$). Table 1 presents the characteristics of the sample for each group.

Functional assessment of PF muscles revealed that FG presented worse function for all the items assessed by the PERFECT scheme and perineometry (Table 2). The data showed a significant association between grade of PF muscle strength (represented by the item "power" in the PERFECT Scheme) and squeeze pressure exerted by PF muscle contractions measured with Peritron. This indicates that the greater the muscle strength, the greater the pressure applied by PF muscles and quantified by the Peritron (rho 0.547; $p < 0.001$).

Table 3 illustrates the results regarding LUTS, which were observed more frequently among women in FG: 65% of them reported some LUTS, such as urine leakage, increased frequency of urination, nocturia, and urinary urgency, while that figure was 26.6% in NFG ($p < 0.001$).

In terms of seeking medical help for treatment of LUTS, 40% of the FG and 29.4% of NFG had sought such treatment ($p = 0.448$). When it comes to Physical Therapy, this percentage was even lower: 8.1% among FG and 11.8% among NFG ($p = 0.644$).

Table 1 Sample characteristics

Variable	FG, $n = 62$	NFG, $n = 64$	*P* value
Age, years old, mean (SD)	46.5 (10.1)	41.1 (10.3)	0.004[b]
Education level, *n* (%)			0.003[a]
Primary	13 (21)	4 (6.2)	
Secondary	31 (50)	24 (37.5)	
Tertiary	18 (29)	36 (56.2)	
Marital status, *n* (%)			0.058[a]
Single	11 (17.7)	23 (35.9)	
Married	39 (62.9)	35 (54.6)	
Common-law	3 (4.8)	0 (0)	
Widower	1 (1.6)	2 (3.1)	
Alcohol consumption, *n* (%)	19 (30.6)	27 (42.2)	0.246[a]
Smoking, *n* (%)	7 (11.3)	2 (3.1)	0.152[a]
Menopause, *n* (%)			0.156 [a]
Yes	21 (33.9)	17 (26.6)	
No	31 (50)	42 (65.6)	
Hysterectomy	12 (16.1)	5 (7.8)	
Have at least one child, *n* (%)			0.093[a]
Yes	49 (79)	42 (65.6)	
No	13 (21)	22 (34.4)	
Children			
1 or 2	27 (43.5)	36 (56.2)	0.002[a]
3 or 4	22 (35.5)	6 (9.4)	
No children	13 (21)	22 (34.4)	

SD standard deviation, *FG* Fibromyalgia Group, *NFG* Non-fibromyalgia Group

[a] Analysis conducted with Fisher's exact test

[b] Analysis conducted with *t* test

Table 2 Pelvic floor muscle function according to the PERFECT Scheme and perineometry

Variable	FG ($n = 62$)	NFG ($n = 64$)	*P* value
P (power)	2 (2–3)	3 (3–4)	< 0.001
E (endurance)	3 (2–3)	3 (3–4)	< 0.001
R (repetition)	2 (2–3)	4 (2.8–5)	< 0.001
F (fast)	3 (2.2–4)	4.5 (3–6)	< 0.001
Peritron (cmH_2O)	32 (19–40.3)	38 (23–51)	0.047

Data presented as median (first-third quartile). *P* value was calculated using the Wilcoxon-Mann-Whitney test

FG Fibromyalgia Group, *NFG* Non-fibromyalgia Group

Table 3 Lower urinary tract symptoms in fibromyalgia group (FG) and non-fibromyalgia group (NFG)

Lower urinary tract symptoms, *n* (%)	FG (*n* = 62)	NFG (*n* = 64)	*P* value
Increased urinary frequency and nocturia	1 (1.6)	0 (0)	0.492[a]
Nocturia without leakage	1 (1.6)	0 (0)	0.492[a]
Stress incontinence	10 (16.1)	8 (12.5)	0.560[b]
Stress and urgency incontinence	17 (27.4)	5 (7.8)	0.003[b]
Stress and urgency incontinence and increased urinary frequency	2 (3.2)	0 (0)	0.240[a]
Urgency incontinence	5 (8.1)	3 (4.7)	0.488[a]
Urinary urgency without leakage	1 (1.6)	0 (0)	0.492[a]
No symptoms	22 (35.4)	47 (73.4)	< 0.001[b]

FG Fibromyalgia Group, *NFG* Non-fibromyalgia Group

[a] Analysis conducted with the Fisher's exact test

[b] Analysis conducted with the chi-square test

Considering the impact of UI on quality of life (Table 4), the women in FG scored higher in all the KHQ domains, indicating poorer perception of quality of life when compared with NFG. However, this difference was only significant in the general health perception ($p < 0.001$) and sleep/energy ($p < 0.003$) domains.

The odds of presenting LUTS is 5.03 (95%CI 2.35–10.75) higher in women with FM. Other factors independently associated to the presence of LUTS were smoking and previous pregnancy (Table 5). Age, alcoholism, presence of menopause, and number of vaginal deliveries were not associated with the presence of LUTS in our population.

Discussion

Considering that women with FM present pain, fatigue, and reduced muscle strength [2], the research hypothesis was that PF muscles would be weaker in women with FM; therefore, it could be associated with LUTS and compromise their quality of life. In this study 64.6% of FM women reported LUTS. Our data suggests that PF function is worse in FG and that there is association between FM and LUTS.

Five studies that assessed urinary dysfunction in women with FM using questionnaires and clinical tests were found in the literature [4–7, 13]. A strong point of the present study is that the evaluation of PF was performed with clinical examination and perineometry and not only with questionnaires.

The mean age of FG was higher than NFG, along with smoking status. The groups were homogenous concerning menopausal status; however, we also find an increased frequency of women who had performed hysterectomy in FG [14]. It is known that some factors predispose women to the occurrence of UI, such as a higher number of pregnancies and deliveries [15], smoking and being older. Although the number of children is higher in FG, this variable isolated cannot be considered a risk factor for the degree of muscle strength observed in women with FM [16]. Despite the age difference between the groups, the menopause status was considered similar, which facilitates the comparison between women with and without FM, considering the hormonal effects on the PF.

Adams et al. [5], in a retrospective study based on questionnaires that assessed PF symptoms and the POP-Q test in women with and without FM, found that FM women had 50% more symptoms than the control group. Their data also suggested that FM is associated with PF dysfunction and levator myalgia.

Table 4 Impact of urinary incontinence on the quality of life of women with and without fibromyalgia according to King Health Questionnaire (KHQ) domains

KHQ domains	FG (*n* = 62)	NFG (*n* = 64)	*P* value
General health perceptions	75 (25–75)	25 (25–25)	< 0.001
Incontinence impact	33 (0–67)	33 (0–33)	0.531
Role limitations	17 (0–50)	0 (0–33)	0.133
Physical limitations	33 (0–50)	17 (0–50)	0.164
Social limitations	0 (0–11)	0 (0–0)	0.089
Personal relationships	0 (0–17)	0 (0–0)	0.076
Emotion	11 (0–33)	0 (0–11)	0.056
Sleep and energy	17 (0–67)	0 (0–17)	0.003
Severity measures	50 (25–67)	33 (25–50)	0.353

Results represented by median (first-third quartiles). *P* value calculated using the Wilcoxon-Mann-Whitney test

KHQ King Health Questionnaire, *FG* Fibromyalgia Group, *NFG* Non-fibromyalgia Group

Table 5 Linear regression to verify independent factors associated to the presence of lower urinary tract symptoms

Variables	*R*	Adjusted R^2	*P* value
Presence of fibromyalgia	3.74	0.15	0.001
Smoking	1.04	0.21	0.002
Previous pregnancy	1.19	0.25	0.007

R factor of determination

In a study carried out in 2008, women with urinary tract symptoms with and without FM were evaluated using quality-of-life questionnaires and urodynamic study. The authors observed that among women with FM, the most common symptoms were increased urinary frequency and urgency incontinence [7], suggesting hyperactivity of the detrusor.

In the present study, the FG presented more stress incontinence associated with urgency incontinence ($p = 0.003$), indicating UI due to stress and overactive bladder. In a study carried out in 2013 by Chung et al. [14], it was observed association between FM and detrusor hyperactivity, and it was found that the incidence of FM was higher among women who presented more severe overactive bladder. The results observed in the present study, similar to those in Chung et al., suggest a relationship between UI and FM.

Our data showed that UI negatively affects quality of life, as demonstrated in the general health perceptions and sleep/energy domains of the KHQ, for which there was statistically significant difference between the groups. In the incontinence impact domain, no differences were observed between the groups. This could be justified by the symptoms of FM, which cause numerous limitations in their daily living activities and are difficult to be treated. This is not the case with UI, in which the treatment promotes significant improvement and presents few side effects. Further studies are needed to investigate the relationship between FM and UI, considering other factors such as depression and anxiety.

Women with FM showed greater odds of presenting LUTS when compared to women without FM, according to logistic regression analysis. However, the data do not allow establishing a causal relationship between the two dysfunctions.

According to the reports of women in both groups, few participants had sought medical care or Physical Therapy to treat urinary tract symptoms. According to Harry et al. [17], genitourinary symptoms have not been effectively addressed by multidisciplinary teams, and patients tend not to seek treatment because they believe these dysfunctions to be a result of aging. Including this topic during patient history assessment can contribute with early diagnosis and treatment of urinary dysfunctions. According to Knorst et al. [18], approximately 50% of women sought medical help 3 to 10 years after the onset of urinary incontinence, and the seek for specialists was more intense only when symptoms became more severe.

In the present study, the FG group obtained significantly lower score for all items of the PERFECT scheme ($p < 0.001$) and perineometry ($p < 0.04$), suggesting that FG women presented poorer PF function than control group.

The present study found an association between LUTS and FM, indicating that more objective assessment of the PF muscles and urinary symptoms should be included in outpatient consultations. Many women do not report these symptoms because they consider them inherent to the aging process.

Limitations of this study include that the examiner was not blind to the group of patients; however, although the PERFECT scheme may be subjective, perineometry is a quantitative and objective method for the assessment of PF function. Besides, we found a positive correlation (rho 0,547; $p < 0,001$) between these two assessment tools (Perineometry and PERFECT), which enlargers its reliability. In addition, the study design does not allow the establishment of a cause-effect relationship between FM and urinary dysfunctions.

In conclusion, the present study showed that there is a relation between FM and LUTS. Women with FM present worse PF function and higher rate of LUTS with negative impact on their quality of life.

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Compliance with ethical standards

The Ethics Committee for Analysis of Research Projects - CAPPesq approved this study, under the number 40789914.1.0000.0065. All participants gave written informed consent before data collection began.

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