



Relationship between pelvic floor muscle and sexual function in physically active older women

Relação da funcionalidade da musculatura do assoalho pélvico com a função sexual de idosas ativas fisicamente

Relación de la funcionalidad de la musculatura del piso pélvico con la función sexual de las personas mayores activas físicamente

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Abstract

Introduction: Physical activity is beneficial to psychological and physical health, which ultimately affects sexual health and quality of life. In turn, strong pelvic floor muscles (PFM) can positively affect the sex life of women. **Objective:** Assess the relationship between pelvic floor muscle and sexual function in physically active older women. **Method:** 35 sexually and physically active older women with an average age of 69.5 years participated in this study. Physical activity level was assessed with an accelerometer. A diagnostic flow chart and the female sexual function index (FSFI) were applied to assess female sexual function and the PERFECT scheme to assess PFM. Data were collected by two previously trained and blinded researchers and submitted to descriptive statistics and Spearman's correlation. **Results:** There was a significant correlation between the number of fast-twitch muscle fiber contractions and sexual function ($\rho = -0.41032$; $p = 0.0144$) and the

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orgasm dimension ($\rho = -0.34679$; $p = 0.0413$) in older participants. **Conclusion:** Pelvic floor muscles are related to female sexual function and it is important for older women to remain physically active.

Keywords: Sexual Function. Pelvic Floor. Exercise. Aged.

Resumo

Introdução: A atividade física é benéfica à saúde física e psicológica, afeta a saúde sexual e a qualidade de vida. Por sua vez, músculos do assoalho pélvico (MAP) fortes podem ter um efeito positivo na vida sexual das mulheres. **Objetivo:** Avaliar a relação entre os MAP e a função sexual em mulheres idosas fisicamente ativas. **Método:** Participaram 35 idosas, sexualmente e fisicamente ativas, com idade média de 69,5 anos. O nível de atividade física foi avaliado com um acelerômetro. Um fluxograma de diagnóstico e índice de função sexual feminina (FSFI) foram aplicados para avaliar a função sexual feminina e o esquema PERFECT para avaliar os MAP. Os dados foram coletados por dois pesquisadores previamente treinados e cegos e submetidos à estatística descritiva e à correlação de Spearman. **Resultados:** Houve uma correlação significativa entre o número de contrações das fibras musculares de contração rápida e a função sexual ($\rho = -0,41032$; $p = 0,0144$) e a dimensão do orgasmo ($\rho = -0,34679$; $p = 0,0413$) nos idosos. **Conclusão:** Os MAP estão relacionados à função sexual feminina e é importante que as mulheres idosas permaneçam fisicamente ativas.

Palavras-chave: Função Sexual. Diafragma da Pelve. Exercício. Idosos.

Resumen

Introducción: La actividad física aporta beneficios para la salud física y psicológica, lo que influencia la salud sexual y la calidad de vida. Por su parte, los músculos del piso pélvico (MAP) cuando están bien entrenados, pueden influir positivamente en la vida sexual de las mujeres. **Objetivo:** Relacionar la funcionalidad de la musculatura del piso pélvico con la función sexual de mujeres ancianas activas físicamente. **Método:** Participaron en el estudio 35 ancianas sexual y físicamente activas con una edad promedio de 69,5 años. El nivel de actividad física se evaluó por medio del acelerómetro. Se aplicó una ficha diagnóstica, Índice de Función Sexual Femenina para evaluar la función sexual femenina, y la evaluación de los músculos del piso pélvico se realizó por medio del esquema PERFECT. La recolección de datos se realizó por pares y a ciegas, con dos investigadoras previamente entrenadas. Los datos fueron tratados por la estadística descriptiva y la correlación de Spearman. **Resultados:** Hubo correlación significativa entre el número de contracciones rápidas de fibras de la musculatura del suelo pélvico y la función sexual ($\rho = -0,41032$, $p = 0,0144$) y la dimensión orgasmo ($\rho = -0,34679$; $p = 0,0413$) en las ancianas investigadas. **Conclusión:** La musculatura del piso pélvico está relacionada con la función sexual femenina, destacando la importancia de mantenerse activa físicamente en la vejez.

Palabras clave: Función Sexual. Diafragma Pélvico. Actividad Motora. Anciano.

Introduction

Sexual health involves general well-being, quality of life [1], sexual identity, physiological sexual function and a satisfying sexual relationship [2]. On the other hand, sexual dysfunction, defined as the impairment of any phase of the sexual response cycle by blockage or inhibition, is characterized by sexual arousal disorders and psychophysiological

changes that cause suffering and interpersonal difficulties [3].

Sexual dysfunctions are classified in hypoactive sexual desire disorder, sexual arousal disorder, orgasmic dysfunction, anorgasmia, dyspareunia, and vaginismus [4, 5]. The estimated prevalence of female sexual dysfunction in Brazil ranges between 13.3% and 79.3% of the population, with values of 11 to 75%, 8 to 68.2%, 29.1 to 41.4%,

18 to 55.4%, and 3.3 to 42% for changes in sexual desire, arousal, lubrication, orgasm and satisfaction, respectively [4].

The causes of sexual dysfunction in women are multifactorial. The variables that most affect the clinical picture of sexual function are changes in pelvic floor muscles (PFM) activity, age, estrogen deficit due to menopause, previous vaginal surgery, fatigue and chronic diseases [5].

There is substantial evidence that strong PFM positively affect the sex life of women [2, 6]. Thus, encouraging physical activity is vital to the older population considering its multiple benefits for muscles [7].

Physical activity is known to be beneficial to physical and psychological health, which influences sexual health and quality of life as a whole [8, 9]. However, studies on sexual function in older adults are scarce [10].

This study assess the relationship between pelvic floor muscle and sexual function in physically active older women.

Methods

This descriptive cross-sectional study was approved by the institutional Research Ethics Committee under protocol number CAAE 42357515.1.0000.5346. A sample of 88 women was estimated to obtain 5% significance and 80% power, based on the study by Virtuoso, Mazo and Menezes [7].

This study was composed of 88 older women who participated in physical-activities group for the aged at a public university in southern Brazil and were treated by the municipal primary health care network. Of the 88 subjects, 44 were considered sexually inactive in the previous four weeks according to the Female Sexual Function Index (FSFI) and 9 were excluded for refusing to undergo the pelvic floor muscle ($n = 2$) or physical activity level assessments ($n = 2$), using the accelerometer for less than 5 days a week ($n = 4$) or falling ill during the study ($n = 1$). Thus, out of the original 88 older women recruited, 35 with preserved cognition, aged between 60 and 77 years, independent in activities of daily living and sexually and physically active were included.

The Mini-Mental State Examination (MMSE) [11, 12], Katz Index of Independence in Activities

of Daily Living (Katz ADL) [13, 14], FSFI and an accelerometer (ActiGraph GT3-X[®]) were used to assess cognitive function, level of independence, sexual function and physical activity level, respectively.

The FSFI was applied to the older women who reported sexual activity in the previous four weeks. This questionnaire was validated for Portuguese by Hentschel et al. [15] and it is composed of 19 questions assessing sexual function in the previous four weeks, covering six sexual response domains: desire, arousal, lubrication, orgasm, satisfaction and pain or discomfort [16]. Each item is scored from zero to five, with zero corresponding to no sexual activity. The maximum score per domain is six and the total score for the scale ranges between 2 and 36 points, with high scores indicating better sexual function [17]. Wiegel et al. [17] validated the FSFI as a diagnostic instrument for female sexual dysfunction. A cutoff point of 26.55 was applied, the most widely used score to identify female sexual dysfunction [16].

An accelerometer was used to select physically active older adults, applying 1,041 counts per minute as a cutoff, the reference value for moderate daily physical activity [18]. For data analysis purposes, to a day be considered valid the device had to be used for at least 600 minutes (10 hours) [19]. Results were presented for participants with at least five valid days of equipment use, including one weekend day [20]. ActiLife software version 6.11.4 was used for data initialization, downloading and filtering.

The research instruments were a diagnostic flow chart to obtain patient identification data, sociodemographic characteristics, health status, and regular physical activity, consisting of 19 questions divided into four blocks (Block 1 – patient identification data; Block 2 – sociodemographic characteristics; Block 3 – health status; Block 4 – physical activity), and the PERFECT scheme [21, 22], which assess functioning of pelvic floor muscle by measuring the strength — between zero and five, based on an adapted Oxford scale —, endurance, repetitions, and number of fast contractions (fast) [23]. The components of the PERFECT scheme were assessed based on tercile measurements (25, 50 and 75%), resulting in the following classifications: strength (weak: 0 to 1; normal: 2 to 3; strong: 4 to 5); endurance (low: 0 to 2; moderate: 3 to 4; and high: 5 to 6 seconds); repetitions (minimum: 0 to 1; intermediate: 2 to 3; and maximum: 4 or more repetitions); and fast (unsatisfactory contractions:

0 to 2 times; slightly satisfactory: 3 to 4 times; and satisfactory: 5 or more times).

Prior to data collection, women were invited to participate in the study and those who agreed provided written informed consent. Then, the instruments were used to define the study participants (MMSE, Katz ADL, FSFI and accelerometer). The questionnaires were applied in interview format and the accelerometer was used for seven days on a normal week. Participants received instructions and informative material on how to use the device. The older women selected were submitted to the diagnostic flow chart in interview format, as well as PFM assessment (PERFECT scheme), the latter carried out in an air-conditioned room (24°C), with the subject in the lithotomy position. The examiner wore gloves coated in water-based lubricant and introduced the 2nd and 3rd fingers 3-4 cm into the vaginal introitus. Participants were advised of the results and given instructions on PFM exercises.

Data were collected between April 2015 and October 2017 by two previously trained and blinded researchers; one carried out the questionnaires in interview format and the other performed PFM assessments (PERFECT scheme). Inter-rater reliability was assessed for PERFECT scheme application by two researchers, indicating significant strong correlations for the different components – strength (ICC = 0.94; $p = 0.008$), endurance (ICC = 0.96, $p = 0.005$), repetitions (ICC = 0.95; $p = 0.007$) and fast (ICC = 0.85; $p = 0.046$) and standardized PFM assessment.

The data collected were stored in Excel® and analyzed using Statistical Package for the Social Sciences software (version 20.0). The Shapiro-Wilk test was used to test data normality, which were non-normal. Data were descriptively analyzed using measures of central tendency (mean, standard deviation, relative and absolute frequency). Spearman's correlation was used to relate the components of PFM function with sexual function and its dimensions in physically active older women.

Results

Participants were 35 older women with an average age of 69.5 (± 9.2) years, preserved cognitive capacity, physically and sexually active and independent in activities of daily living; 77% were married and 83% lived with a partner; 43% had 5 to 8 years of schooling and 26% 1 to 4 years. Considering socioeconomic characteristics, 54% were retired and 23% were not actively employed, with monthly income between one and two (37%) and two to three minimum monthly wages (29%) (Table 1). In terms of health status, 49% considered their health good and the main diseases reported were systemic hypertension (63%), labyrinthitis (40%) and urinary incontinence (31%) (Table 1).

Table 2 describes the components and classifications of pelvic floor muscle function (strength, endurance, repetitions and fast) based on the PERFECT scheme, according to the sexual function of older women with and without sexual dysfunction. Of the 35 participants studied, 19 had no sexual dysfunction. Considering PFM function, 46% showed average strength (2-3), 29% of whom had no sexual dysfunction and 17% with dysfunction; 54% exhibited low endurance, 26% with and 29% without dysfunction; 43% performed 4 or more sustained contractions, 23% with and 20% without dysfunction; and 51% performed 5 or more fast-twitch fiber contractions, considered satisfactory, 29% with and 23% without sexual dysfunction.

Table 3 presents the correlation between the PFM components (strength, endurance, repetitions and fast contractions) of the PERFECT scheme and sexual function (FSFI) and its dimensions (desire, arousal, lubrication, orgasm, satisfaction and pain). A significant weak correlation was observed between the number of PFM fast-twitch fiber contractions, sexual function ($\rho = -0.41032$; $p = 0.0144$) and the orgasm dimension ($\rho = -0.34679$; $p = 0.0413$). Additionally, the higher the number of fast-twitch fiber contractions, the poorer the sexual function and orgasm of the participants.

Table 1 – Sociodemographic characteristics and health status of sexual and physically active older women (n = 35) in Santa Maria, RS, 2018

Sociodemographic characteristics	f	%
Marital Status		
Single	1	3
Married	27	77
Separated	5	14
Widow(er)	2	6
Schooling (No. of years)		
1 to 4	9	26
5 to 8	15	43
9 to 11	7	20
More than 11	4	11
Living situation		
Lives alone	2	6
Lives with a partner	29	83
Lives with family (children, grandchildren)	11	31
Current Occupation		
Retired	19	54
Receiving state pension	2	6
Actively retired	2	6
Actively employed	3	9
Not actively employed	8	23
Monthly Income (in minimum wages)		
Less than 1	2	6
1 to 2	13	37
2 to 3	10	29
3 to 4	3	9
4 to 6	3	9
More than 6	4	11
Health Status		
	f	%
Current health		
Excellent	8	23
Good	17	49
Average	10	29
Diseases reported		
Systemic hypertension	22	63
Labyrinthitis	14	40
Urinary incontinence	11	31
Arthritis and arthrosis	11	31
Heart disease	8	23
Hypothyroidism	8	23
Gastritis	8	23
Diabetes	8	23
Osteoporosis and osteopenia	7	20
Heart attack	5	14
Depression	4	11
Herniated disk	4	11

Note: f = absolute frequency; % = relative frequency. Table compiled by the authors (2018).

Table 2 – Components and classifications of pelvic floor muscle function (PERFECT scheme) according to the sexual function (FSFI) of physically active older women (n = 35) in Santa Maria, RS, 2018

PERFECT Scheme Components/ Classifications	FSFI		
	With sexual dysfunction (n = 16) f (%)	Without sexual dysfunction (n = 19) f (%)	Total (n = 35) f (%)
Strength^p			
Strong 4-5	7 (20)	4 (11)	11 (31)
Weak 0-1	3 (9)	5 (14)	8 (23)
Average 2-3	6 (17)	10 (29)	16 (46)
Endurance^s			
0-2	9 (26)	10 (29)	19(54)
3-4	5 (14)	6 (17)	11(31)
5-7	2 (6)	3 (9)	5(15)
Repetitions^{ns}			
0-1	1 (3)	6 (17)	7 (20)
2-3	7 (20)	6 (17)	13 (37)
4 or more	8 (23)	7 (20)	15 (43)
Fast^{nf}			
0-2	2 (6)	6 (17)	8 (23)
3-4	4 (11)	5 (14)	9 (26)
5 or more	10 (29)	8 (23)	18 (51)

Note: FSFI = Female sexual function index; f = absolute frequency; % = relative frequency; p = muscle strength; s = seconds; ns = number of sustained contractions; nf = number of fast contractions. Table compiled by the authors (2018).

Table 3 – Correlation between pelvic floor muscle (PERFECT scheme) and sexual function and its dimensions (FSFI) in physically active older women (n = 35) in Santa Maria, RS, 2018

FSFI Dimensions	PERFECT Scheme Components			
	Pp rho	Es rho	Rns rho	Fnf rho
	p	p	p	p
Desire	-0.04434 0.800	0.14928 0.3921	-0.09957 0.5693	-0.09575 0.5843
Arousal	-0.19567 0.2600	-0.05306 0.7621	-0.29648 0.0837	-0.17616 0.3114
Lubrication	-0.02612 0.8816	-0.05521 0.7528	-0.19500 0.2616	-0.31519 0.0651
Orgasm	-0.00044 0.9980	0.09201 0.5991	-0.07677 0.6611	-0.34679* 0.0413
Satisfaction	-0.12295 0.4816	-0.23703 0.1704	-0.19036 0.2734	-0.14260 0.4138
Pain	-0.32831 0.0542	-0.05839 0.7390	-0.09758 0.5771	-0.25171 0.1447
Total Score	-0.26628 0.1221	-0.08580 0.6241	-0.29556 0.0847	-0.41032* 0.0144

Note: FSFI: Female sexual function index; P = Strength; E = Endurance; R = Repetitions; F = Fast; p = muscle power; s = seconds; ns = number of sustained contractions; nf = number of fast contractions; rho = Spearman's correlation; p = significance level; *p < 0.05. Table compiled by the authors (2018).

Discussion

This study revealed a relationship between the number of PFM fast-twitch fiber contractions, sexual function and orgasm dimension in physically

active older women. Aging promotes a gradual and progressive decline in muscle mass and selective atrophy of fast-twitch fibers [7]. This may be related to the shorter duration of orgasms, with fewer and weaker vaginal contractions [7].

The levator ani, bulbocavernosus and ischiocavernosus muscles participate in female sexual response and function and they are responsible for the rhythmic and involuntary contractions that occur during orgasm. Thus, PFM function is an important attribute for female sexual function, as demonstrated in a study with women in Florianópolis, Santa Catarina state (SC), Brazil [24].

Studies [25, 26] suggest that PFM strength is related to sexual function, specifically orgasm and arousal. In this respect, women submitted to pelvic floor muscle training (PFMT) show a significant improvement in FSFI dimensions and total score [27, 28]. Effective voluntary PFM contractions contribute to a better body image, increased vascularization and improvements in pelvic floor muscle tone and hypertrophy, which may lead to better sexual function [27, 28]. However, studies on the relationship between PF dysfunction and sexual function scores are scarce [29].

In this study, most participants presented average PFM strength, low endurance, 4 or more sustained contractions and satisfactory fast-twitch muscle fiber contractions. Older women with average strength and low endurance displayed no sexual dysfunctions.

Franceschet, Sacomori and Cardoso [30] found that four of the 19 FSFI variables (“how would you rate your level of sexual desire or interest?”, “how often do you feel sexually aroused?”, “how would you rate your level of sexual arousal?” and “how often have you been satisfied with your ability to reach orgasm?”) presented no correlation with the degree of PFM contraction. This was attributed because these variables are more closely linked to psychological aspects than physical component of sexual function [31].

By contrast, a study in Belém, Pará state, Brazil assessing the possible relationship between female sexual function and the degree of PFM contraction in 20 to 40 year-old sexually active women indicated that the stronger the PFM contractions, the better the sexual function indices in healthy women [32]. Thus, women submitted to PFMT presented a significant improvement in sexual function scores on the FSFI questionnaire (in all domains and the total score) [24].

In regard to sexual dysfunction, almost half older women studied presented some form of dysfunction. Cavalcanti [33] obtained similar results, whereby 46.2% of 35 to 65 year-old women with a steady

partner in the previous 6 months displayed sexual dysfunction. Another study [34] with women aged between 18 and 43 years indicated a low prevalence (25.6%) of sexual dysfunction, associated with emotional distress due to sexual dissatisfaction. Darski et al. [35] assessed 20 to 40 year-old women and found no association between sexual satisfaction and PFM function. As such, age and hormonal patterns may determine PFM behavior and sexual function.

In light of the above and the results obtained, it is important to underscore the study limitations, namely the small sample size due to the difficulty to find sexually and physically active older women and their reluctance to answer intimate questions regarding sexual function, as well as the subjective nature of PFM assessment using the PERFECT scheme.

Conclusion

A relationship was identified between the number of fast-twitch pelvic floor muscle fiber contractions, orgasm dimension, and total sexual function score in physically active older women, demonstrating that PFM function is related to female sexual function in old age.

As such, interventions on pelvic floor muscle training are necessary to improve the sexual function of older women and to mitigate the loss of function that occurs in these muscles with aging.

Experimental and longitudinal studies should be conducted to strengthen scientific evidence on pelvic floor muscles and sexual function in physically active older women of different ages, using direct PFM measurement devices such as a perineometer.

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