ORIGINAL ARTICLE

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Is total muscle strength related to pelvic floor muscle strength in young women?

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ABSTRACT

Introduction: The intravaginal examination is an important part of the pelvic floor muscle (PFM) functional assessment. However, women sometimes refuse to submit to this procedure due to being embarrassed. This justifies the investigation of other alternatives of evaluation that could contribute to the treatment of pelvic floor disorders. Handgrip strength (HGS) provides an approximation of overall muscle strength, strongly associated with functionality, and this could be indirectly linked to the pelvic floor musculature. **Objective:** To verify whether there is a correlation between PFM strength and HGS. **Methods:** This is an observational study that evaluated 51 young women who filled out a clinical evaluation form and were submitted to pelvic floor evaluation, using the Modified Oxford Scale, Peritron® perineometer, and HGS (Saehan® dynamometer). For the perineometer and handgrip strength test, three repetitions of the maximum contraction were performed, considering the average of the attempts for analysis. Student's t-test and Pearson's coefficient were used to determine the correlation between variables, considering significance <0.05. **Results:** The participants were normotrophic, with a mean age of 23.14 ± 3.14 years, most were undergraduate students and physically active. The correlation coefficient between handgrip and pelvic floor musculature strength was 0.21 with a confidence interval of -0.07 to 0.46 and a significant value of 0.137. **Conclusion:** Pelvic floor muscle strength had a weak positive association with HGS. Therefore, it is not possible to state that women who have satisfactory HGS have a strong pelvic floor.

Keywords: pelvic floor; manual dynamometry; women.

INTRODUCTION

Handgrip strength (HGS) indirectly assesses global muscle strength 1, as it is related to strength measures of other muscles. In this sense, weakness in the upper distal extremities presupposes this same condition in other muscle groups[1]. This relationship was observed in muscle groups in the trunk, hip, knee, ankle[2], wrist, elbow, and shoulder flexors, and extensors[3].

HGS is a simple, non-invasive, and low-cost measure that has good validity and reliability indices. It is considered the gold standard in the assessment of isometric strength and can be measured using a manual dynamometer[4,5].

Despite the relationship with global muscle strength, no studies were found that directly assessed the correlation between HGS and pelvic floor muscle (PFM) strength. Guzelant et al.[6] compared HGS between women with and without pelvic organ prolapse and found no difference between groups. Other authors investigated the association between HGS in people with urinary incontinence and found that continent subjects had greater handgrip capacity than incontinent subjects[7,8].

Therapeutic interventions for patients with pelvic floor disorders should be tailored to specific individual needs, after performing PFM strength assessment[9]. During this assessment, it is recommended that digital palpation, perineometry, vaginal dynamometry, and electromyography be performed, the first two being the most used methods due to their low cost and easy applicability[10,11]. However, they can generate embarrassment and discomfort[12].

O'Laughlin et al.[13] reported that intravaginal exams are clinical procedures that cause more negative emotional and physical symptoms such as pain, discomfort, fear, embarrassment, and irritability. These symptoms can result in delay or inability to treat pelvic floor disorders.

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Faced with the challenges of performing the intravaginal examination, the effectiveness of other less invasive strategies must be investigated. Considering that the HGS test is known to be an indirect way of assessing global muscle strength, it is necessary to verify whether there is a correlation between this test and the digital assessment of PFM strength. If the initial assessment could not be replaced by the dynamometer, it could be used to monitor PFM training and strength improvement. This study hypothesizes that HGS has a positive correlation to PFM strength.

Thus, the main objective of this study was to verify whether there is a correlation between PFM strength and HGS and as a secondary objective, to investigate factors that may be related to the increase or decrease in HGS and PFM strength.

METHODS

This observational study was conducted at the Human Movement Epidemiology Laboratory (EPIMOV), at the Federal University of São Paulo (Unifesp) on the Baixada Santista *campus*, from August 2019 to March 2020. It is nested within a larger research project approved by the Research Ethics Committee of the Federal University of São Paulo under opinion number 0340/2019. The sample calculation was based on the mean and standard deviation values of a pilot study, defining a sample error of 0.15 with a magnitude coefficient of 0.70, determining the number of 46 volunteers.

The dissemination of the study to attract volunteers was conducted through digital media, by sharing information about the research on social networks, and by invitation made personally by the researcher.

Women aged between 19 and 30 years and with active sexual life were included in the study. Volunteers with the absence of PFM contraction, with any neurological or mental health condition, with a history of urogynecological surgery, and with the presence of neuromuscular comorbidities were excluded.

After signing the free and informed consent form, the participants received information about PFM anatomy and physiology in simple and plain language through an illustrative image and then answered a sociodemographic and clinical questionnaire. The main evaluated outcomes in this study were: PFM quality contraction or awareness, PFM strength, PFM endurance contraction (in seconds), and handgrip strength.

The physical examination of the pelvic floor muscles was performed by a single examiner - a physiotherapist with 20 years of experience in this type of assessment. For the examination, the participant was naked, in the supine position, and with the lower limbs apart and flexed. Initially, the inspection of the genital region was conducted to verify the presence of scars, skin lesions, genital prolapses, and signs indicative of infections.

Then, the examiner asked the participant to perform the PFM contraction, with the following verbal command: “Contract the pelvic floor muscles by pulling the vagina and anus inwards and upwards.” At this time, it was observed that the existence of isolated pelvic floor contraction (classified as good awareness) use of accessory muscles (classified as regular awareness), or even the absence of PFM contraction. The latter was considered an exclusion criterion. To avoid fatigue, at each PFM contraction a rest time of 1:3 was respected, that is, at each second of contraction there were three seconds of rest.

After the request for PFM contraction, the examiner performed digital palpation to grade the pelvic floor muscle strength, using the Modified Oxford Scale[14].

Then, perineometry was performed using a perineometer - Peritron®- to quantify the meaning of the maximum support peak (in cmH_2O), and the duration (in seconds) of

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PFM contraction. The inflatable vaginal sensor, after being coated with a lubricated condom, was inserted into the vaginal opening and the probe was inflated until the pressure reached 100 cm H_2O. At this moment, the device was reset and calibrated, and the examiner requested the PFM contraction for as long as possible, in a sequence of three sessions and with an interval of 30 seconds between them. The contraction values and the sustaining time were recorded, considering the average of the contractions for analysis.

Subsequently, the HGS test was performed using a Saehan® hydraulic dynamometer. The examiner asked the participants to remove rings, bracelets, watches, or any other object present in their dominant hand. The mobile dynamometer handle was standardized in level II, and the positioning of the volunteers followed the recommendations of the American Society of Hand Therapists: participants sitting comfortably on a chair without an armrest, with the spine leaning against the chair, legs parallel, feet on the floor, dominant shoulder adducted, elbow flexed to 90°, and forearm in a neutral position[15]. To avoid bias, through a motivating verbal command, the volunteers were instructed to press the dynamometer with maximum force for five seconds, performing three repetitions with an interval of 30 seconds between them. The means of the contractions were calculated for further analysis.

Statistical analysis

Data from descriptive measures were analyzed and presented as mean and standard deviation. To describe the frequency of the study variables, these data were presented as percentages.

To compare clinical variables about perineometry and dynamometry, the normality of the data was verified, involving the analysis of Q-Q plots and the application of the Shapiro-Wilk test. The results indicated that the data distributions were satisfactory

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for the subsequent application of the student's t-test for independent samples. The significance established was 0.05.

Pearson's linear correlation coefficient was used to investigate the correlation between the average dynamometry and perineometry variables. To study the correlation between the Oxford variable and the Dynamometer and Perineometer variables, the Spearman correlation coefficient was calculated, since the Oxford variable is ordinal. The results were interpreted according to Schober et al.[16], in which coefficients (r) with values between 0 and 0.10 indicate insignificant correlation; values between 0.11 and 0.39, weak correlation; values between 0.40 and 0.69, moderate correlation; between 0.70 and 0.89, strong correlation; and between 0.90 and 1 correspond to a very strong correlation[16].

RESULTS

Fifty-eight women were selected and agreed to participate in the study and fifty-one were included (Figure 1). The clinical and sociodemographic characteristics of the participants are described in Table 1, demonstrating that the majority are single, students, physically active, and nulliparous.

Table 2 describes the results of the physical examination: PFM awareness, PFM strength, and support measured by the perineometer and Modified Oxford Scale, and HGS verified by the dynamometer. They demonstrated a good awareness and strength of pelvic floor muscle contraction.

Student's t-test showed that there was no difference in pelvic floor muscle strength and hand grip according to perineal awareness, parity, physical activity, presence of urinary incontinence, dyspareunia, BMI, and dominance (Table 3).

PFM strength was positively and weakly associated with HGS, with a coefficient of 0.26 (Table 4). The added distribution of these variables is shown in Figure 2.

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DISCUSSION

The main objective of this study was to investigate the correlation of PFM strength with HGS and to discuss new evaluation possibilities that could contribute to the planning, evolution, and monitoring of the treatment of pelvic floor disorders. According to the results of this study, it is not possible to affirm that women with strong PFM have satisfactory grip strength and vice versa.

If the result of the correlation of PFM strength with HGS, we do not believe that it would be possible to replace the first one with the other. However, after the initial PFM strength assessment, it could be possible to follow up pelvic floor training only with reassessments with HGS. It would be a more comfortable way for women and preferred among them as well.

According to Bo and Sherburn, quantifying PFM contraction by measuring vaginal pressure using a perineometer is satisfactory[17]. However, there is a need for the examiner to take some exceptional care such as providing adequate instructions to the women, motivating maximum contraction, and observing the PFM strength to make sure that the contraction is being performed correctly. Therefore, the experience and specific training of the evaluator is essential for replicable and valid results. Bo and Sherburn recommend that this assessment be performed by the same physical therapist, as performed in this study[17].

Several authors point out that about 30% of women do not have body awareness, therefore, they are unable to perform PFM contraction properly[18-20]. This value is like that found in the present study, in which 29.14% of the participants had PFM contraction associated with the abdominal muscles, glutes, adductors, and/or breathing.

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In this study, we chose to assess PFM strength with digital palpation - Oxford Scale - and perineometry as they are replicable and dependable methods[17]. The results found from these two methods were lower than those described in the literature. Regarding the Oxford Scale, the average was 3.24 and Ferreira et al.[21] found an average of four when assessing 20 young university students with an average age of 24 years[21]. This difference was due to the number of women evaluated, which was lower than in the present study (51 volunteers). In another study, the authors found comparable results, although they evaluated women in an older age group (22 to 85 years) and with urinary incontinence, which would justify worse muscle strength[22].

In perimetry, the mean was 33.3±17.10 cmH20, a value much lower than the study by Ferreira et al.[21] (45.50 cmH_20) and others that involved women aged over 45 years, such as de Menezes et al.[23], who found results 42 cmH_2O; and Fusco et al.[24], with a force of 41 cmH_2O. This difference may have occurred because, in this study, almost 20% of the young women evaluated had some degree of urinary incontinence, unlike the studies mentioned above.

Regarding the HGS test, the reference values vary between different populations, according to gender, age, and dominance[25]. In a study with an age group from 19 to 29 years old, the authors found a mean of 23.53 ± 0.48 kg/f[26], while other authors found 26.3 kg/f in the right hand and 25.3 kg/f in the left hand[25]. The HGS value verified in the present study was higher than that found by Lim et al.[26], a result that can be justified by the cultural differences of the studied population (South Korea and Brazil). Another study points out that the type of arm activity performed can also impact HGS[27], however, this variable was not verified in the present study.

Furthermore, the studies found, that there was no standardization for the performance of the HGS assessment about the performance of muscle warm-up before

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the test[28] and the command voice[29]. A muscle warm-up study was not performed in the present study, which may justify the lower value found in the HGS test.

The use of equipment that is widely used in literature stands out in this study, such as the perineometer[10,11] and the manual dynamometer[5]. In addition, the volunteers evaluated showed homogeneity in terms of age, parity, and pelvic floor dysfunctions. As a strong point of this study, the positioning, language, and manual touch used by the examiner stand out, as well as guidance about the pelvic floor, based on an illustration. These are strategies that can favor the contraction of this musculature.

As limitations of this study, the small number of women evaluated and the consequent suspension of in-person activities due to the COVID-19 pandemic are considered; and not investigating the type of physical activity of each volunteer. It is known that high-impact exercises generate a significant increase in intra-abdominal pressure, which can lead to pelvic floor dysfunction[30]. We can highlight that a comparison was made between an analog dynamometer and an electronic one, as a suggestion for future studies to conduct a comparison between two manual dynamometers. Furthermore, this sample of healthy young women cannot be considered representative of the entire population, although it has shown itself to be adequate for initial conclusions.

Conclusion

PFM strength had a weak positive association with handgrip strength. However, due to the strength of the correlation, it is not possible to state that increased handgrip strength is associated with a strong pelvic floor.

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REFERENCES

1. Zanin C, Jorge MSG, Knob B, Wibelinger LM, Libero GA. Força de preensão palmar em idosos: uma revisão integrativa. PAJAR. 2018;6(1):22-8.
https://doi.org/10.15448/2357-9641.2018.1.29339

2. Porto JM, Nakaishi APM, Cangussu-Oliveira LM, Freire Júnior RC, Spilla SB, Abreu DCC. The relationship between grip strength and global muscle strength in community-dwelling older people. Arch Gerontol Geriatr. 2019;82:273-8.
https://doi.org/10.1016/j.archger.2019.03.005

3. Martins JC, Aguiar LT, Lara EM, Teixeira-Salmela LF, Faria CD. Assessment of grip strength with the modified sphygmomanometer test: association between upper limb global strength and motor function. Braz J Phys Ther. 2015;19(6):498-506.
https://doi.org/10.1590/bjpt-rbf.2014.0118

4. Shechtman O, Gestewitz L, Kimble C. Reliability, and validity of the DynEx dynamometer. J Hand Ther. 2005;18(3):339-47.
https://doi.org/10.1197/j.jht.2005.04.002

5. Gąsior JS, Pawłowski M, Jeleń PJ, Rameckers EA, Williams CA, Makuch R, et al. Test-Retest Reliability of Handgrip Strength Measurement in Children and Preadolescents. Int J Environ Res Public Health. 2020;17(21):8026.
https://doi.org/10.3390/ijerph17218026

6. Guzelant AY, Tasdemir N, Sarifakioglu AB, Abali R, Celik C. Assesment of Hand grip Strength in Patients with Pelvic Organ Prolapse. J Clin Analytical Med. 2015;6(6):771-4.
https://doi.org/10.4328/JCAM.2416

7. Podvratnik V, Šćepanović D, Jakovljević M. Urinska inkontinenca in zmogljivost prijema roke. Fizioterapija (Ljubljana). 2013;21(1):1-6.

8. Yang SJ, Park JH, Oh Y, Kim H, Kong M, Moon J. Association of decreased grip strength with lower urinary tract symptoms in women: a cross-sectional study from Korea. BMC Women's Health. 2021;21:96.
https://doi.org/10.1186/s12905-021-01241-4

9. Grimes WR, Stratton M. Pelvic Floor Dysfunction. Treasure Island (FL): StatPearls, 2022.

10. Bo K, Frawley HC, Haylen BT, Abramov Y, Almeida FG, Berghmans B, et al. An International Urogynecological Association (IUGA)/International Continence Society

https://doi.org/10.7322/abcshs.2023037.2290

(ICS) joint report on the terminology for the conservative and nonpharmacological management of female pelvic floor dysfunction. Neurourol Urodyn. 2017;36(2):221-44. https://doi.org/10.1002/nau.23107

11. Angelo PH, Varella LRD, Oliveira MCE, Matias MGL, Azevedo MAR, Almeida LM, et al. A manometry classification to assess pelvic floor muscle function in women. PloS One. 2017;12(10):e0187045.
https://doi.org/10.1371/journal.pone.0187045

12. Aktas D, Kumas MB, Odabasioglu BS, Kaya A. Effect of a special examination gown and nature-based sounds on anxiety in women undergoing a gynecological examination. Clin Nurs Res. 2018;27(5):521-39.
https://doi.org/10.1177/1054773816686475

13. O'Laughlin DJ, Strelow B, Fellows N, Kelsey E, Peters S, Stevens J, et al. Addressing Anxiety and Fear during the Female Pelvic Examination. J Primary Care Community Health. 2021;12:2150132721992195.
https://doi.org/10.1177/2150132721992195

14. Laycock J. Clinical evaluation of the pelvic floor. In: Pelvic floor reeducation. London: Springer-Verlag, 1994; p. 42-8.

15. Fess E, Moran C. Grip strength. In: Casanova JS. Clinical assessment recommendations. 2 ed. Chicago: American Society of Hand Therapists, 1992; p. 41-5.

16. Schober P, Boer C, Schwarte LA. Correlation coefficients: appropriate use and interpretation. Anesthes Analg. 2018;126(5):1763-8.
https://doi.org/10.1213/ANE.0000000000002864

17. Bo K, Sherburn M. Evaluation of female pelvic-floor muscle function and strength. Phys Ther. 2005;85(3):269-82.

18. Sluijs EM, Kok GJ, van der Zee J. Correlates of exercise compliance in physical therapy. Phys Ther. 1993;73(11):771-82.
https://doi.org/10.1093/ptj/73.11.771

19. Moen M, Noone M, Vassallo B, Lopata R, Nash M, Sum B, et al. Knowledge and Performance of Pelvic Muscle Exercises in Women. J Pelvic Med Surgery. 2007;13(3):113-17.
https://doi.org/10.1097/01.spv.0000263643.80110.40

20. Vermandel A, Wachter S, Beyltjens T, D'Hondt D, Jacquemyn Y, Wyndaele JJ. Pelvic floor awareness and the positive effect of verbal instructions in 958 women early postdelivery. Int Urogynecol J. 2015;26(2):223-8.

https://doi.org/10.7322/abcshs.2023037.2290

https://doi.org/10.1007/s00192-014-2483-x

21. Ferreira CHJ, Barbosa PB, Souza FO, Antônio FI, Franco MM, Bø K. Inter-rater reliability study of the modified Oxford Grading Scale and the Peritron manometer. Physiotherapy. 2011;97(2):132-8.
https://doi.org/10.1016/j.physio.2010.06.007

22. Chevalier F, Fernandez-Lao C, Cuesta-Vargas AI. Normal reference values of strength in pelvic floor muscle of women: a descriptive and inferential study. BMC Women's Health. 2014; 14:143.
https://doi.org/10.1186/s12905-014-0143-4

23. Franco MM, Driusso P, Bø K, Abreu DCC, Silva LA, Silva ACJSR, et al. Relationship between pelvic floor muscle strength and sexual dysfunction in postmenopausal women: a cross-sectional study. Int Urogynecol J. 2017;28(6):931-6.
https://doi.org/10.1007/s00192-016-3211-5

24. Fusco HCSC, Pontes Filho MAG, Haddad JM, Zanetti MRD, Marques AP, Ferreira EAG. Lower urinary tract symptoms and perineal function in women with and without fibromyalgia: a cross-sectional study. Clin Rheumatol. 2019;38(10):2885-90.
https://doi.org/10.1007/s10067-019-04617-y

25. Amaral CA, Amaral TLM, Monteiro GTR, Vasconcellos MTL, Portela MC. Hand grip strength: Reference values for adults and elderly people of Rio Branco, Acre, Brazil. PLoS One. 2019;14(1):e0211452.
https://doi.org/10.1371/journal.pone.0211452

26. Lim SH, Kim YH, Lee JS. Normative Data on Grip Strength in a Population-Based Study with Adjusting Confounding Factors: Sixth Korea National Health and Nutrition Examination Survey (2014-2015). Int J Environ Res Public Health. 2019;16(12):2235.
https://doi.org/10.3390/ijerph16122235

27. Yang ST, Jeong BY. Comparison of accident characteristics between manual materials handling (MMH) and non-MMH works in the automobile parts manufacturing industry: Based South Korea US. Work. 2019;62(2):197-203.
https://doi.org/10.3233/WOR-192855

28. Marion R, Niebuhr BR. Effect of warm-up before maximal grip contractions. J Hand Ther. 1992;5(3):143-6.
https://doi.org/10.1016/S0894-1130(12)80349-8

29. Johansson CA, Kent BE, Shepard, KF. Relationship between verbal command volume and magnitude of muscle contraction. Phys Ther. 1983;63(8):1260-5.
https://doi.org/10.1093/ptj/63.8.1260

30. Nygaard IE. Does Prolonged High-impact Activity Contribute to Later Urinary Incontinence? A Retrospective Cohort Study of Female Olympians. Obstetr Gynecol. 1997;90(5):718-22.
https://doi.org/10.1016/S0029-7844(97)00436-5

Figure 1: Study data flow chart.

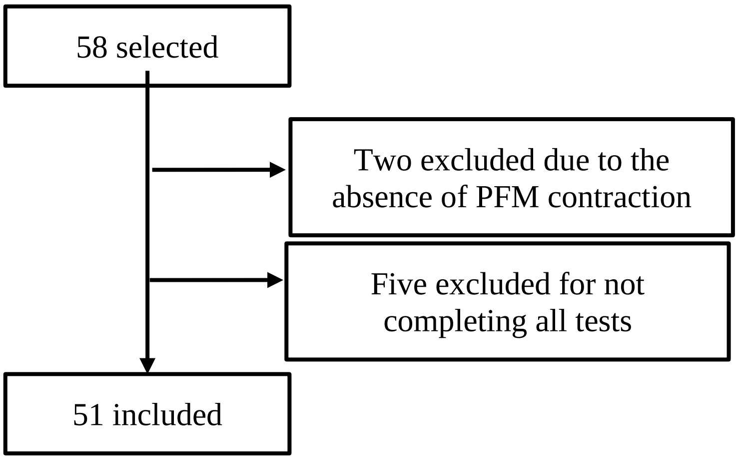

Figure 2: The added distribution of the HGS and PFM contraction force variables through Pearson's linear correlation coefficient

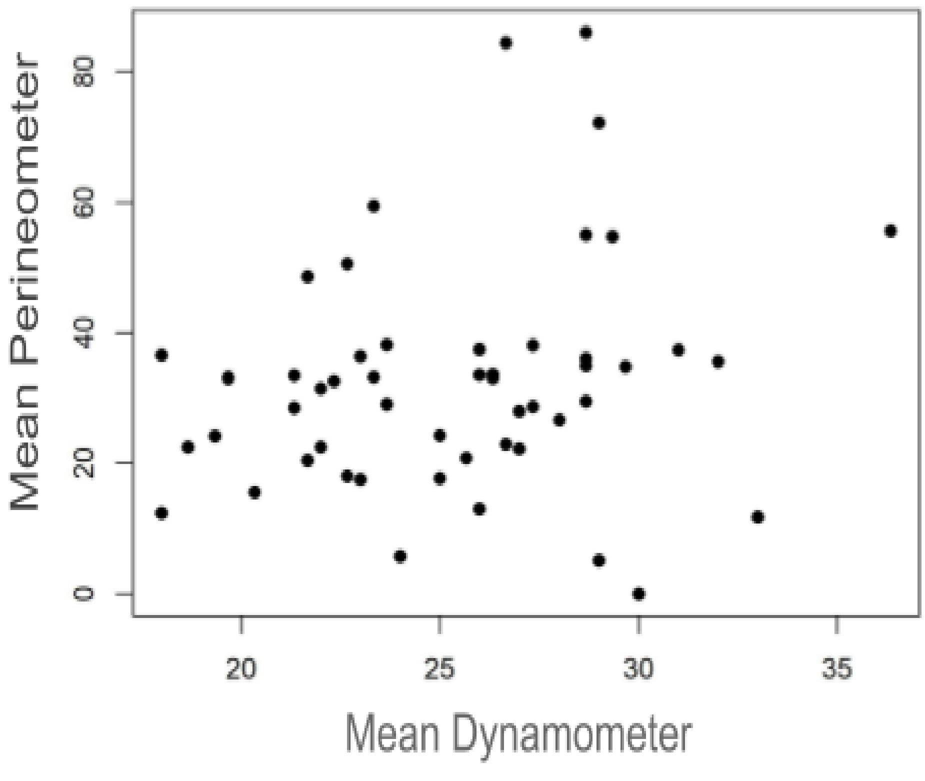

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Table 1: Clinical and sociodemographic characteristics of the study participants.

Variables	**Mean ± SD**
Age (years)	23.14±3.14
BMI (m/kg^2)	23.08±4.45
	n (%)
Marital status	
Married	1 (1.96)
Single	50 (98.04)
Students	46 (90.19)
Physically active	35 (68.62)
Parity	
Primiparous	1 (1.96)
Nulliparous	50 (98.04)
Dyspareunia	15 (29.41)
Urinary Incontinence	10 (19.6)

n number of participants, *SD* standard deviation, *BMI* body mass index

Table 2: Results of PFM awareness, perineometry, Oxford Scale, and HGS.

Variables		**n (%)**	
Good awareness		36 (70.59)	
Regular awareness		15 (29.41)	
	Mean ± SD	**Minimum**	**Maximum**
Oxford 0 to 5	3.24±0.82	1	5
Perineometer (cmH20)	33.3±17.10	5.13	86
Perineometer Endurance (s)	4.36±3.01	1	10
Dynamometer (Kg/f)	25.20±4.02	18.0	36.30

n number of participants, *SD* standard deviation, *cmH$_2$0* centimeters of water, *s* seconds, *Kg/f* kilograms force.

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Table 3: Correlation of PFM and HGS with different variables.

Variables	(n) %	Perineometer Mean ± SD	Dynamometer Mean ± SD
Awareness			
Good	(36) 70.59	34.49±17.68	25.32±3.70
Regular	(15) 29.41	30.29±15.89	24.84±4.82
p-value		0.412	0.733
Parity			
Primiparous	(2) 3.92	59.58±37.35	26±3.77
Nulliparous	(49) 96.08	32.18±15.70	25.15±4.06
p-value	-	0.487	0.804
Physical activity			
Physically active	(16) 31.37	33.20±17.62	25.56±3.98
Physically inactive	(35) 68.63	33.38±16.54	24.35±4.10
p-value	-	0.971	0.333
UI			
Continents	(41) 80.4	34.20±17.81	24.96±3.45
Incontinent	(10) 19.6	29.37±14.14	26.10±5.97
p-value	-	0.372	0.574
Dyspareunia			
With dyspareunia	(15) 29.14	33.88±11.45	24.42±5.20
Without Dyspareunia	(36) 70.59	32.99±19.14	25.50±3.38
p-value	-	0.837	0.476
Dominance			
Right	(49) 96.08	59.58±37.35	26±3.77
Left	(2) 3.92	32.18±15.70	25.15±4.06
p-value	-	0.487	0.804
BMI			
Eutrophy	(33) 64.71	35.06±16.23	25.2±3.60
Underweight	(5) 9.81	34.51±1.64	22.8±4.52
p-value (eutrophy/ underweight)	-	0.851	0.31
Overweight	(11) 21.56	24.43±14.93	26±5.22
p-value (eutrophy/ Overweight)	-	0.06	0.645
Obesity	(2) 3.92	48.72±50.46	26.33±0.47
p value(eutrophy/obesity)	-	0.767	0.132

n number of participants, *%* percentage, ± standard deviation, *SD* standard deviation, *p* level of significance, *UI* urinary incontinence, *BMI* body mass index

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Table 4: Correlation result between variables HGS, Perineometer and Oxford

Variables	Coefficient	*p*
HGS and Perineometer	0.26	0.060
Oxford and Perineometer†	0.59	<0.001
Oxford and HGS†	0.12	0.424

† Spearman's correlation, *p* descriptive level.

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