

# Older women with urinary incontinence have higher prevalence of dynapenia: A cross-sectional study

## Abstract

**Objective:** To investigate the association between muscle strength and the presence of Urinary Incontinence (UI) in older women.

**Method:** The sample consisted of 236 dwelling older women residing in Porto Alegre/ Brazil. Data collection was performed through the application of the International Consultation on Incontinence Questionnaire - Short Form (ICIQ-SF), the Sit-to-Stand Test (STS), and evaluation of handgrip strength using dynamometry.

**Results:** 158 (66%) of the evaluated older women did not have UI, while 78 (33%) did. When comparing the means of the STS, no difference was found between the groups, however, there was a statistically significant difference in the handgrip dynamometry test. It was found that 35.89% of women with dynapenia had UI, compared to 20.88% of those without UI, showing a significant difference in the Chi-square test ( $X^2=0.0132$ ).

**Conclusion:** Older women with UI have lower handgrip strength and an average handgrip strength indicative of dynapenia. The prevalence of UI was 58% higher in dynapenic women.

**Keywords:** urinary incontinence, muscle strength, women, aging

Volume 9 Issue 1 - 2024

Luis Fernando Ferreira,<sup>1,2</sup> Jéssica Roda Cardoso,<sup>1</sup> Priscilla Dalenogare,<sup>1</sup> Cislaine Machado de Souza,<sup>1</sup> Gabriela Tomedi Leites,<sup>1</sup> Luis Henrique Telles da Rosa,<sup>1</sup> Patrícia Viana da Rosa<sup>1</sup>

<sup>1</sup>Federal University of Health Sciences of Porto Alegre, Brazil

<sup>2</sup>Queen's University of Belfast, Northern Ireland, United Kingdom

Kingdom

**Correspondence:** Luis Fernando Ferreira, Department of Medicine: hepatology, Federal University of Health Sciences of Porto Alegre, Porto Alegre, Brazil, Tel 55 51 98070-7053, Email profferferando@gmail.com

**Received:** March 16, 2024 | **Published:** March 29, 2024

## Background

Urinary Incontinence (UI) is described by the International Continence Society (ICS) as any involuntary loss of urine.<sup>1</sup> UI impacts biopsychosocial aspects and may be related to depressive symptoms, social isolation, loss of self-esteem, and frustration.<sup>2</sup> Its incidence increases with advancing age, being present in 44% to 53% of women aged 65 years or older. Between the ages of 60 and 69, the prevalence increases to 73.5% in women.<sup>3-5</sup> With the increasing life expectancy, there is a tendency for older people to present specific age-related changes in greater proportion. Dynapenia, characterized by reduced muscle strength, is a suggestive factor for the development of UI in this population.<sup>6,7</sup> Furthermore, it is expected that the lower the muscle strength, the greater the severity of UI.<sup>8,9</sup> Thus, the aim of the present study was to investigate the association between muscle strength and the presence of UI in older women from the community.

## Methods

### Study design, population, and sample

This is a descriptive cross-sectional study. The population consisted of older women, aged 60 years or older, who met pre-established inclusion criteria. The sample size calculation was based on the total number of subjects residing in the IAPI neighborhood, city of Porto Alegre, Brazil, in the four census areas by the Brazilian Institute of Geography and Statistics (IBGE). A population error of 5% and a confidence level of 5% were adopted. Data collection was carried out by three trained researchers in a single home visit. The sample inclusion criteria were: being female, aged 60 years or older, residing for at least 12 months in the IAPI neighborhood, and having signed the Informed Consent Form (ICF). Hospitalized or institutionalized older women, or those unable to perform the assessments or respond to the questionnaires proposed by this research, were excluded.

### Instruments and data collection procedures

The presence of UI was identified using the International Consultation on Continence Questionnaire - Short Form (ICQ-SF),<sup>10</sup>

validated for the Portuguese language. The ICQ-SF is a simple, brief, and self-administered questionnaire that quickly assesses the impact of UI on quality of life and qualifies urinary loss in patients of both sexes. The maximum possible score is 21 points, indicating a high impact of UI on the individual's life. For the assessment of lower limb strength, the Sit-to-Stand Test (STS) was used. The STS consisted of asking the patient to sit and stand up from a chair without using their hands. The test was timed, and it was verified how many times the individual could stand up from the chair within a 30-second interval.<sup>11</sup>

Handgrip strength was tested using Manual Dynamometry. Manual dynamometry was performed using a portable dynamometer, Jamar brand (Jamar hydraulic hand dynamometer - Sammons Preston Rolyan, IL, USA).<sup>12</sup> For grip strength assessment, individuals performed a muscle contraction of the upper limb flexors, in a seated position with the shoulder adducted, elbow flexed at 90°, and forearm in a neutral position, adopting an isometric contraction of five seconds, with the measurement repeated three times, and the best result adopted for analysis.

### Ethical aspects

This study is part of a project approved by the research ethics committee of UFCSPA under registration number 1466/11. The older women who agreed to participate in the study signed the Informed Consent Form after receiving a clear explanation and understanding of the objectives, risks, and benefits of this study.

### Statistical analysis

Descriptive variables are presented as mean and standard deviation (mean  $\pm$  SD), and categorical variables as absolute and relative numbers (n and %). Student's t-test was used to compare means between groups with and without urinary incontinence, and the Chi-square test was used to assess the association between categorical variables. The adopted p-value was  $p < 0.05$  for all analyses as statistically significant. The analyses were performed using SPSS software version 25 (IBM SPSS Statistics for Windows, Version 25.0. IBM Corp., Armonk, NY).

## Results

Table 1 presents the descriptive data of the analyzed population. A total of 298 older women were evaluated, with 158 (67%) not presenting UI, and 78 (33%) showing the presence of UI. There were no significant differences in any of the sample characterization variables (age, height, weight, BMI, and WHR) between the groups, indicating homogeneity in the samples. However, in the strength assessments, although there is a favorable difference in favor of the group without UI, this difference lacks statistical significance, although it has clinical relevance. In contrast, the handgrip strength and ICIQ-SF tests resulted in a significant difference in favor of the group without UI (Table 1).

**Table 1** Descriptive data (n=236)

Variable (Mean±SD)	Group 1 (n=158)		Group 2 (n=78)		p		
Age (years)	75,03	±	7,1	76,07	±	6,87	,287
Height (m)	1,55	±	0,06	1,54	±	0,06	,529
Weight (Kg)	65,57	±	12,88	66,33	±	12,31	,662
BMI (Kg/m <sup>2</sup> )	27,25	±	4,85	27,85	±	5,22	,379
WHR (cm/cm)	0,88	±	0,06	0,89	±	0,06	,576
Sit-to-stand (s)	10,26	±	3,73	9,41	±	3,26	,086
Handgrip strength (Kg/f)	20,23	±	4,88	18,64	±	4,97	,020
ICIQ-SF	19,57	±	4,59	17,83	±	4,74	,007

Where: SD, standard deviation; Group 1, women without urinary incontinence; Group 2

**Table 2** Description of the data associating dynapenia and urinary incontinence by the Chi-square test. (n=236)

Dynapenia - n (%)	Urinary incontinence - n (%)		Total
	With IU	Without IU	
Present	28 (11,86)	33 (13,98)	61 (25,84)
Absent	50 (21,18)	125 (52,96)	175 (74,16)
Total	78 (33)	158 (67)	236 (100)

$\chi^2=0,0132$ .

## Discussion

### Prevalence

In this study, a prevalence of 33% of UI in elderly women was found. This data is supported by various studies in the literature, such as the study by Batmani et al.,<sup>3</sup> which found an average prevalence of 37.1% in their systematic review with data from around the world. However, these same authors discuss that the prevalence can vary according to the region where the individual lives, as prevalence rates ranging from 9.5% in Mexican populations to 45.1% in Asian populations have been found. Hu et al.,<sup>2</sup> emphasize that although global prevalences have an average of one in every three elderly women, various factors can impact the results, such as physical capacity, incidence of urogynecological pathologies, lifestyle habits, and even the assessment methods chosen by researchers when evaluating a population. Thus, it is important for prevalence data to be carefully analyzed, checking whether confounding variables may influence the result.

This study, therefore, should be compared with similar studies that assessed similar populations with compatible instruments. Kessler et al.,<sup>13</sup> found in their study a prevalence of 37% in Brazilians, where 26.9% of the female population had UI, while men had 10.3%. In a study in southern Brazil, Marques et al.,<sup>14</sup> pointed out that 36.3% of women were incontinent, while only 17.0% of men had the dysfunction.

Women with urinary incontinence; p: Student's t-test; m: meters; Kg: kilograms; BMI: body mass index; WHR: Waist-hip ratio; Kg/cm<sup>2</sup>: kilograms divided by square meters; cm: centimeters; s: seconds; Kg/f: kilograms of force; ICIQ-SF: the International Consultation on Continence Questionnaire - Short Form.

In Table 2, the comparison data of urinary incontinence variables and the presence of dynapenia through the Chi-square test are presented. We can observe in this table that more than one-third of women with UI also had dynapenia (35.89% of women with UI), while only one-fifth of women without UI had dynapenia (20.88% of women without UI). This represented a significant Chi-square difference between the groups, favoring the group without UI (Table 2).

### Relation dynapenia X urinary incontinence

This study found lower mean values of lower limb and upper limb strength in women with UI (9.41±3.26 and 18.64±4.97, respectively) compared to women without UI (10.26±3.73 and 20.23±4.88, respectively), along with a higher prevalence of dynapenia in women with UI compared to those without UI (20.88% versus 35.89%).<sup>15,16</sup>

Several studies demonstrate important correlations between urinary incontinence, such as poorer perception of quality of life, BMI above (overweight) or below (undernutrition) average, hypertension, use of certain medications, and urogynecological and obstetric histories.<sup>17</sup> However, few studies focus on relating dynapenia, or even the capacity to produce force, with this phenomenon. Kim et al.,<sup>18</sup> in a study with 1,399 individuals, successfully correlated UI with musculoskeletal conditions, such as low strength and muscle pain. Kim et al.,<sup>19</sup> found that women with UI had worse physical fitness, including weaker handgrip strength.

On the other hand, Lenardt et al.,<sup>20</sup> in a study comparing handgrip strength with various factors of the elderly individual's life, were able to prove correlation with falls, age, and sex, for example, but not with UI. Although nearly half of the sample of 203 individuals had UI, there was no significant correlation. This means that, although there is evidence of the relationship between UI and strength, demonstrated even by basic studies, which suggest that the overall decrease in strength, caused by aging, can also affect the pelvic floor, theoretically

increasing the incidence of UI; or that the common problems in the elderly population - geriatric syndromes - can increase the risk of UI, larger studies are still needed, preferably with follow-up, to better measure the level at which muscle strength and urinary incontinence are related.

## Conclusion

This study indicated a significant association between dynapenia and urinary incontinence in elderly women, mainly with these assessment methods. Although pelvic floor strength was not evaluated, it can be hypothesized that the occurrence of dynapenia may also affect these muscles. Therefore, an important aspect to be considered in the care of the elderly is not to underestimate the presence of dynapenia in a geriatric assessment, as this factor should strengthen the need for urinary incontinence assessment in this population.

Further studies aiming to analyze the prospective behavior of these variables should be developed with larger samples and preferably from different locations, in order to reduce the influence of habits and environment on the analyzed results. Additionally, other assessment instruments should be considered for new studies, such as pelvic floor strength assessment, isokinetic dynamometry, and measurement of urinary loss.

## Acknowledgments

None.

## Conflicts of interest

The authors declare no conflicts of interest of any nature.

## Funding

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) – Finance Code 001.

## References

- Aoki Y, Brown HW, Brubaker L, et al. Urinary incontinence in women. *National Library of Medicine*. 2017;3(1):7042.
- Hu JS, Pierre EF. Urinary incontinence in women: Evaluation and management. *National Library of Medicine*. 2019;100(6):339–348.
- Batmani S, Jalali R, Mohammadi M, et al. Prevalence and factors related to urinary incontinence in older adults women worldwide: a comprehensive systematic review and meta-analysis of observational studies. *BMC Geriatrics*. 2021;21(1):212.
- Lukacz ES, Santiago Lastra Y, Albo ME, et al. Urinary incontinence in women: A review. *JAMA*. 2017;318(16):1592–604.
- Peate I. Urinary incontinence in women: treatment recommendations. *Br J Nurs*. 2019;28(22):1486–1488.
- Suskind AM, Cawthon PM, Nakagawa S, et al. Urinary incontinence in older women: The role of body composition and muscle strength: From the health, aging, and body composition study. *J Am Geriatr Soc*. 2017;65(1):42–50.
- Huang TY, Liang CK, Shen HC, et al. Gait Speed rather than dynapenia is a simple indicator for complex care needs: A cross-sectional study using minimum data set. *Sci Rep*. 2017;7(1):8418.
- Nygaard IE, Shaw JM. Physical activity and the pelvic floor. *Am J Obstet Gynecol*. 2016;214(2):164–171.
- Sohn K, Lee CK, Shin J, et al. Association between female urinary incontinence and geriatric health problems: Results from Korean longitudinal study of ageing 2006. *Korean J Fam Med*. 2018;39(1):10–14.
- Tamanini JT, Dambros M, D Ancona CA, et al. Validation of the “International Consultation on Incontinence Questionnaire -- Short Form” (ICIQ-SF) for Portuguese. *Rev Saude Publica*. 2004;38(3):438–444.
- Cruz Jentoft AJ, Bahat G, Bauer J, et al. Sarcopenia: revised European consensus on definition and diagnosis. *Age Ageing*. 2019;48(1):16–31.
- Fess EE. Grip strength. In: Clinical assessment recommendations. JSC, editor. Chicago, IL: American Society of Hand Therapists; 1992.
- Kessler M, Facchini LA, Soares MU, et al. Prevalence of urinary incontinence among the elderly and relationship with physical and mental health indicators / Prevalência de incontinência urinária em idosos e relação com indicadores de saúde física e mental. *Rev bras geriatr gerontol (Online)*. 2018;21(4):397–407.
- Marques LP, Schneider IJC, Giehl MWC, et al. Demographic, health conditions, and lifestyle factors associated with urinary incontinence in elderly from Florianópolis, Santa Catarina, Brazil. *Rev bras epidemiol*. 2015;18(3):595–606.
- Najafi Z, Morowatisharifabad MA, Jambarsang S, et al. Urinary incontinence and related quality of life among elderly women in Tabas, South Khorasan, Iran. *BMC Urology*. 2022;22(1):214.
- Eshkoor SA, Hamid TA, Shahar S, et al. Factors related to urinary incontinence among the Malaysian elderly. *J Nutr Health Aging*. 2017;21(2):220–226.
- Kaşıkçı M, Kılıç D, Aşar G, Şirin M. Prevalence of urinary incontinence in older Turkish women, risk factors, and effect on activities of daily living. *Arch Gerontol Geriatr*. 2015;61(2):217–223.
- Kim H, Yoshida H, Hu X, et al. Association between self-reported urinary incontinence and musculoskeletal conditions in community-dwelling elderly women: a cross-sectional study. *NeuroUrol Urodyn*. 2015;34(4):322–326.
- Kim H, Yoshida H, Hu X, et al. Risk factors associated with onset of urinary incontinence in a community-dwelling elderly population: a 4-year follow-up study. *Nihon Koshu Eisei Zasshi*. 2004;51(8):612–622.
- Lenardt MH, Carneiro NHK, Betiolli SE, et al. Factors associated with reduced manual pre-pressing in children. *Esc Anna Nery*. 2016;20(4):12.