Identifying deficits in lower limb muscle strength, balance and mobility in elderly women suffering from urge and mixed urinary incontinence

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Context

- Although urinary incontinence (UI) has been associated with an increased risk of falls, few studies have investigated the association between IU and mobility restrictions[1,2].

- Despite that it is reported to be a research priority by the International Consultation on Incontinence[3], no studies have investigated the relation between UI and lower limb strength, mobility, balance using standardized and comprehensive assessment tools.

Aim of the study

- To compare deficits in lower limb muscle strength, mobility and balance performance as well as confidence in elderly women with or without urge or mixed UI.

Study design and Participants

STUDY DESIGN

- An observational case-control study

PARTICIPANTS

- 20 elderly women with urge or mixed UI (with urgency as predominant symptoms)
- 20 elderly continent women

The two groups were matched according to age (±3 years), body mass index (±5 kg/m²) and whether or not they had fallen in the previous 12 months.

Inclusion criteria
- Aged 65 years and older
- Ambulatory (safely and independently of mobility aids)
- Continent or reported symptoms of urge or mixed UI at least 3 times per week for the previous 3 months
- Living in the community

Exclusion criteria
- Presented medical conditions or medications that could have interfered with the assessment

Methodology

PROCEDURES

- Women underwent a standardized assessment with a trained evaluator including interview for collecting baseline characteristics (age, BMI, parity) followed by four validated questionnaires and physical testing.
- Women were asked to empty their bladder prior to the physical testing.

A) QUESTIONNAIRES

1) *Cognitive function* (Mini-Mental State Examination (MMSE))
2) *UI symptoms* (International Consultation on Incontinence Questionnaire-UI short form (ICIQ-UI-SF))
3) *Physical and mental health status* (SF-12 Health Survey)
4) *Balance confidence* (Activities-specific Balance Confidence Simplified (ABC))
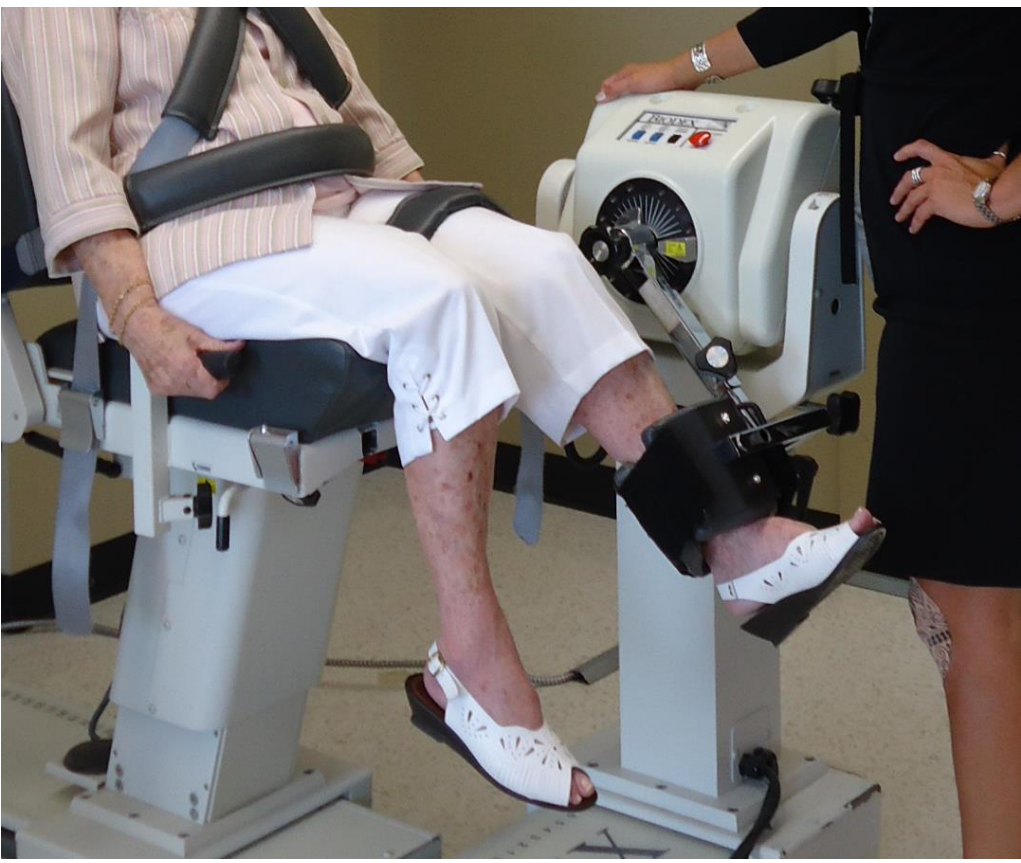
B) PHYSICAL TESTING

1) *Lower limb isometric muscle strength* (Biodex dynamometer): Knee flexors and extensors were assessed while the knee was at 60º of extension. Maximal torque determined from three trials was selected for analysis and normalized for body weight (Maximal torque (N.m)/body weight (kg²)).
2) *Balance performance* (Unipodal Stance Test): The participants were asked to stand on their dominant leg as long as possible up to 60 s. The duration of the stance was evaluated in seconds (s).
3) *Mobility* (Speed gait): The women were asked to walk a distance of 10m and the mean gait speed was calculated (m/s).

STATISTICAL ANALYSIS

- Mann-Whitney U tests were used to compare women with and without UI. Median and interquartile range (IR) were used to describe the data. The statistical significant level was set at p = 0.05.

Results

- The two groups were similar for all baseline characteristics (Table 1).
- Among the women with UI, 9 had urge and 11 mixed UI symptoms.
- Data from questionnaires and physical testing are presented in Table 2 and 3, respectively.

Table 1: Participants' characteristics

	Continent women Median (IR)	Urge/Mixed UI women Median (IR)	p-value
Age (years)	72 (67 - 76)	71 (67-76)	0.779
BMI (kg/m2)	24.8 (23.1 - 28.5)	28.2 (24.9 – 29.7)	0.157
Parity	2 (0 – 3)	2 (1 – 4)	0.398
Occurrence of falls in the last 12 months	1 (0 – 1)	1 (0 – 2)	0.820
Cognitive function (MMSE)	30 (29 – 30)	29 (29 – 30)	0.201

Table 2: Questionnaire data

	Continent women Median (IR)	Urge/Mixed UI women Median (IR)	p-value
UI symptoms (ICIQ-SF)	0	11 (8 – 16)	<0.001*
Physical health status (SF-12)	57 (IR: 46-59)	48 (IR: 40-53)	0.002*
Mental health status (SF-12)	55 (IR: 46-59)	52 (IR: 43-57)	0.201
Balance confidence (ABC-scale)	41 (37 – 43)	38 (29 - 42)	0.038*

Table 3 Muscle strength, balance performance and mobility

	Continent women Median (IR)	Urge/Mixed UI women Median (IR)	p- value
Lower limb muscle strength			
Normalized non-dominant knee extensor torque (N.m/kg²)	1.50 (1.13 – 2.04)	1.25 (0.97 – 1.65)	0.192
Normalized non-dominant knee flexor torque (N.m/kg²)	0.57 (0.51 - 0.74)	0.62 (0.49 - 0.71)	0.947
Normalized dominant knee extensor torque (N.m/kg²)	1.62 (1.22 – 2.03)	1.31 (1.02 – 1.80)	0.142
Normalized dominant knee flexor torque (N.m/kg²)	0.64 (0.54 - 0.77)	0.64 (0.51 - 0.71)	0.398
Balance performance			
Unipodal Stance Testing (on the dominant leg) (s)	26 (8 - 53)	4 (2 – 11)	0.001*
Mobility			
Mean gait speed (m/s)	1.8 (1.5 – 2.9)	1.6 (1.4 – 1.8)	0.023*

Discussion

- Elderly women suffering from urge/mixed IU had a lower physical health status than continent women, which could partially be attributed to UI symptoms.

- Women with UI presented a significantly lower gait speed compared to continent women as already demonstrated in the literature[2]. In addition, our study showed that women with UI have lower balance performance and lower balance confidence.

- However, knee flexor and extensor muscle strengths were not significantly different between the two groups. Perhaps, other muscles such as the hip flexors could be involved because of their implication in gait and balance.

Concluding message

- This study provides evidences that balance performance and confidence as well as mobility are affected in elderly women suffering from urge/mixed UI.

- Therefore, the assessment and treatment of older women presenting UI symptoms should not be limited to the urinary system.

References

[1] The Journal of urology 2008;179(4):1449-1453; discussion 1453-1444.
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