

## IDENTIFYING DEFICITS IN LOWER LIMB MUSCLE STRENGTH, BALANCE AND MOBILITY IN ELDERLY WOMEN SUFFERING FROM URGE AND MIXED URINARY INCONTINENCE

### Hypothesis / aims of study

Urinary incontinence (UI) has been associated with an increased risk of falls in the elderly. Very few trials have suggested the association between UI and mobility restrictions [1;2]. Moreover, until now, no studies have investigated the relations between UI and lower limb strength, balance performance and balance confidence and mobility using standardized and comprehensive assessment tools. It should be highlighted that this unexplored link corresponds to a research priority proposed by the International Consultation on Incontinence 2009 [3]. The aim of this study was to investigate and compare deficits in lower limb muscle strength, balance confidence/performance and mobility in elderly women with or without urge or mixed UI.

### Study design, materials and methods

Twenty women suffering from urge or mixed UI with urgency predominant symptoms and twenty continent women participated in this study. They were recruited from local newspaper ads or posters and were matched according to age ( $\pm 3$  years), body mass index ( $\pm 5$  kg/m<sup>2</sup>) and whether or not they had fallen in the previous 12 months. To be included in the study, women had to be 65 or older, living in the community, ambulant (walk and move about safely and independently), present symptoms of urge or mixed UI at least 3 times per week for the previous 3 months.

After signing the consent form, women underwent a standardized assessment with a trained evaluator. The assessment comprised of an interview for collecting baseline characteristics (age, BMI, parity) followed by four validated questionnaires. These included the Mini-Mental State Examination (MMSE) and the ICIQ-UI Short Form to examine the cognitive function and severity of incontinence symptoms, respectively. The SF-12 Health Survey was also used to assess the overall physical and mental health status. Women were asked to empty their bladder prior to physical testing. Lower limb muscle strength was evaluated with the Biodex dynamometer (Biodex Medical Systems, Shirley NY) during isometric contractions. Knee flexors and extensors were assessed while the knee was at 60° of extension and the maximal torque determined with three trials was selected for analysis and normalized for body weight. Balance was assessed with the Unipodal Stance Test in which the participants had to stand on the dominant leg as long as possible up to 60 s. The Activities-specific Balance Confidence (ABC)-Simplified scale was also used to assess participants' balance confidence in performing 15 daily living tasks of varying difficulty level. Finally, mobility was assessed using a standardized test - the mean gait speed on a 10 meter distance. Mann-Whitney U tests were used to compare women with and without UI.

### Results

The two groups were similar for all baseline characteristics (Table 1). Among the women with incontinence, 9 had urge UI and 11 had mixed UI symptoms. They had a median ICIQ-UI short form score of 11 (interquartile range (IR): 8 - 16). All continent women had a score of 0 at the ICIQ-UI short form ( $p < 0.001$ ). In incontinent women, the physical median score of the SF-12 Health Survey was significantly lower with 48 (IR: 40-53) compared to 57 (IR: 46-59) in continent women ( $p = 0.002$ ). The mental score of the SF-12 Health Survey was similar in incontinent women (median 52 (IR: 43-57) and continent (median 55 (IR: 46-59)) ( $p = 0.127$ ). Results from muscle strength, balance performance, balance confidence and mobility are presented in Table 2.

**Table 1. Baseline characteristics in continent and mixed/urge UI women**

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

**Table 2 Muscle strength, balance performance and confidence and mobility in continent and urge/mixed UI women**

	Continent women Median (IR)	Urge/Mixed UI women Median (IR)	p- values
<b>Lower limb muscle strength</b>			
Non-dominant knee extensor torque normalized to body weight (N.m/kg <sup>2</sup> )	1.50 (1.13 – 2.04)	1.25 (0.97 – 1.65)	0.192
Non-dominant knee flexor torque normalized to body weight (N.m/kg <sup>2</sup> )	0.57 (0.51 - 0.74)	0.62 (0.49 - 0.71)	0.947
Dominant knee extensor torque normalized to body weight (N.m/kg <sup>2</sup> )	1.62 (1.22 – 2.03)	1.31 (1.02 – 1.80)	0.142
Dominant knee flexor torque normalized to body weight (N.m/kg <sup>2</sup> )	0.64 (0.54 - 0.77)	0.64 (0.51 - 0.71)	0.398
<b>Balance performance and confidence</b>			
Unipodal Stance Testing (on the dominant leg) (s)	26 (8 - 53)	4 (2 – 11)	0.001*
ABC scale	41 (37 – 43)	38 (29 - 42)	0.038*
<b>Mobility</b>			
Mean gait speed (m/s)	1.8 (1.5 – 2.9)	1.6 (1.4 – 1.8)	0.023*

\* alpha level is set at 0.05

#### Interpretation of results

Older women suffering from urge/mixed IU had a lower physical health status than continent women which can partially be attributed to urinary symptoms. Knee flexor and extensor muscle torques were not significantly different between incontinent and continent women. However, incontinent women presented a significantly lower speed gait, balance performance and balance confidence as compared to continent women.

#### Concluding message

Overall, the results of this study provide novel information. It suggests balance and mobility deficits in older women suffering from urge/mixed UI. Therefore, the assessment of older women presenting UI should not be limited to the urinary system.

#### References

1. The Journal of urology 2008;179(4):1449-1453; discussion 1453-1444.
2. Obstetrics and gynecology 2007;109(4):909-916.
3. Incontinence Fourth International Consultation on Incontinence. France: Health Public Publication Ltd., 2009. pp. 37-111.

#### Disclosures

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