Correspondence

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Characteristics, scope of activity, and negative emotions in elderly women with urinary incontinence: Based on a longitudinal follow-up in Shanghai, China

Yunwei Zhang[1,§], Changying Wang[1,§], Xiaoyan Yu[2,§], Lingshan Wan[1], Wendi Cheng[1], Chunyan Xie[1], Duo Chen[1], Yifan Cao[1], Jia Xue[1], Yuhong Niu[1,*], Hansheng Ding[1,*]

[1] Shanghai Health Development Research Center (Shanghai Medical Information Center), Shanghai, China;
[2] Jiangning Road Community Health Service Center of Jing'an District, Shanghai, China.

SUMMARY We conducted a study to assess the characteristics, scope of activity, and negative emotions in elderly women with urinary incontinence (UI) based on a longitudinal follow-up conducted in Shanghai, China from 2013 to 2019. A total of 3,531 elderly women were included in the final analysis, and 697 women who experienced UI during follow-up were included in the UI group. Subjects with UI were subdivided into those with partial UI (UI once a day or less) and UI (frequent UI). Two thousand eight hundred and thirty-four women who did not have UI during the same period served as the control group. The prevalence of UI was 19.74% in this study. Logistic regression analysis revealed that being older (> 80 years of age), having a high level of education (> 12 years; elderly people with a high level of education may pay more attention to their health and notice UI more readily), a low personal monthly income (≤ 3,000 RMB), more gravidity/parity, and having a chronic disease (chronic obstructive pulmonary disease (COPD), dementia, or Parkinson's disease) were risk factors for UI ($p < 0.05$). About 60% of women in the partial UI group engaged in daily activities outdoors, while this number decreased sharply to 3.6% in the UI group. Women in the UI group were more likely to have negative emotions, such as depression, anxiety, irritability, or feeling worthless ($p < 0.001$). Among elderly women with dementia, those with UI had defects in terms of judgment in everyday life, the ability of convey information, and the ability to understand information ($p < 0.05$). More attention needs to be paid to the adverse effects of UI on activities of daily living (ADL) and mental health in the future.

Keywords dementia, emotion, caregiving

Urinary incontinence (UI) is a common disease in the elderly, and a study had revealed that its prevalence in Chinese elderly women is 16.9% (*1*). Women with UI were more likely to have symptoms of anxiety and depression, as well as poor quality of life (QoL). There is a consensus that UI greatly affects QoL, and even mild urinary leakage significantly reduces QoL. UI also involves certain expenses. A study reported that women with UI used an average of 1.8 ± 2.1 incontinence products in 24 hours with a mean weekly cost of $5.42 ± $8.59 (*2*). Some chronic conditions like COPD, dementia, and Parkison's disease (PD) warrant attention in women with UI.

In summary, UI is one of the most common geriatric syndromes, influencing overall health, QoL, and financial circumstances in elderly people. The current large-scale population-based study sought to explore possible factors related to UI, with a focus on women with UI and dementia. The study protocol was approved by the Ethics Committee of the Shanghai Health Development Research Center (No. 2022009), and all subjects signed a written informed consent form prior to commencing the study.

Study design

This study was designed based on a longitudinal follow-up conducted in Shanghai (China) from 2013 to 2021 (Supplemental Data, *http://www.biosciencetrends.com/action/getSupplementalData.php?ID=141*). The inclusion criteria were: *i*) women who age 60 and older; *ii*) individuals who were continuously followed; *iii*) women who did not have UI at the beginning of the study; and *iv*) women who responded "Yes" to the

question "Do you have UI?" during the study. Data from 2013 to 2015 were used because subjects with UI were relatively concentrated and follow-up was continuous during this period. A total of 3,531 elderly women were included in the final analysis, and 697 women who experienced UI during follow-up were included in the UI group. These women were subdivided into those with partial UI (UI once a day or less) and UI (frequent UI). Two thousand eight hundred and thirty-four women who did not have UI during the same period served as the control group. Demographic and disease characteristics, scope of activity, and emotion were obtained using the Unified Needs Assessment Form for Elderly Care, and cognitive function was assessed by community doctors.

Comparison of the characteristics of women with and without UI

Of 3,531 elderly women who participated in this study, 697 had UI (642 with partial UI and 55 with UI), so the prevalence of UI was 19.74% (Table 1). Women with UI had a higher level of education, a higher rate of widowhood, lower personal income, and less gravidity/parity ($p < 0.05$). Women with UI were less likely to live in the community ($p < 0.001$) and live alone ($p = 0.002$) since they may need more assistance from caregivers. Women with UI had a higher prevalence of diabetes, COPD, dementia, PD, and worse performance in activities of daily living (ADL) ($p < 0.05$).

The prevalence of UI in this study was similar to that in another large sample cross-sectional study (*3*). A previous study focusing on Chinese women found that its prevalence was similar to that in Western countries (14.84%) (*4*). Studies have revealed that UI can be considered a possible consequence of metabolic syndrome. Obesity, diabetes, and, to a lesser extent, high blood pressure and cigarette smoking have been associated with UI in different settings. Thus, prevention programs aimed at losing weight, quitting smoking, a healthy diet, and increasing physical activity have resulted in a decreased incidence, prevalence, and severity of UI (*5*).

Table 1. Characteristics of subjects without UI, with partial UI, and with UI

Characteristic	Women without UI (n = 2,834)	Women in the partial UI group (n = 642)	Women in the UI group (n = 55)	p*
Demographic characteristics				
Age (years)				< 0.001
60-69	1,170 (41.28)	133 (20.71)	4 (7.27)	
70-79	780 (27.52)	148 (23.05)	6 (10.91)	
≥ 80	884 (31.20)	361 (56.24)	45 (81.82)	
BMI (kg/m^2)				< 0.001
< 18.5	145 (5.12)	38 (5.92)	9 (16.36)	
18.5-23.9	1,568 (55.33)	373 (58.10)	22 (40.0)	
24.0-27.9	968 (34.15)	190 (29.60)	22 (40.0)	
≥ 28	153 (5.40)	41 (6.38)	2 (3.64)	
Education				< 0.001
≤ 6years	1,112 (39.24)	258 (40.19)	40 (72.73)	
7-12 years	1,639 (57.83)	331 (51.56)	14 (25.45)	
> 12 years	83 (2.93)	53 (8.25)	1 (1.82)	
Widowhood				< 0.001
Yes	791 (27.91)	239 (37.23)	32 (58.18)	
No	2,043 (72.09)	403 (62.77)	23 (41.82)	
Living in the community	2,783 (98.20)	623 (97.04)	40 (72.73)	< 0.001
Residing				0.002
Alone	618 (21.81)	139 (21.65)	9 (16.36)	
With spouse or children	2,146 (75.72)	481 (74.92)	39 (70.91)	
With other people	70 (2.47)	22 (3.43)	7 (12.73)	
Personal monthly income (RMB)				< 0.001
≤ 3,000	1,086 (38.32)	340 (52.96)	26 (47.27)	
3,001-3,900	1,168 (41.21)	219 (34.11)	12 (21.82)	
> 3,900	580 (20.47)	83 (12.93)	17 (30.91)	
Gravidity/Parity				< 0.001
≤ 2	2,296 (81.02)	465 (72.43)	28 (50.91)	
> 2	538 (18.98)	177 (27.57)	27 (49.09)	
Disease characteristics				
Hypertension	2,040 (71.98)	484 (75.39)	41 (74.55)	0.33
Diabetes	615 (21.70)	151 (23.52)	20 (36.36)	0.03
COPD	45 (1.59)	19 (2.96)	3 (5.45)	0.01
Dementia	20 (0.71)	15 (2.34)	9 (16.36)	< 0.001
PD	18 (0.64)	10 (1.56)	3 (5.45)	< 0.001
ADL				< 0.001
Normal	2,309 (81.47)	1 (0.16)	1 (1.82)	
Mild disability	424 (14.96)	428 (66.67)	1 (1.82)	
Moderate disability	92 (3.25)	124 (19.31)	1 (1.82)	
Severe disability	9 (0.32)	89 (13.86)	52 (94.54)	

*p value of differences in subjects without UI, with partial UI, and with UI. BMI, body mass index; UI, urinary incontinence; COPD, chronic obstructive pulmonary disease; ADL, activities of daily living; PD, Parkinson's disease.

Table 2. Risk factors for elderly women with UI

Characteristic	*n* (%)	OR	95% CI	*p*
Diabetes (yes)	171 (24.53)	1.20	0.93-1.54	0.17
COPD (yes)	22 (3.16)	2.20	1.22-3.98	< 0.001
Dementia (yes)	24 (3.44)	4.77	2.15-10.56	< 0.001
Parkinson's disease (yes)	13 (1.87)	3.21	1.42-7.28	0.01
Age				
60-69	137 (19.66)	1.00	-	-
70-79	154 (22.09)	2.23	1.69-2.93	0.44
≥ 80	406 (58.25)	5.90	4.39-7.93	< 0.001
BMI				
< 18.5	47 (6.74)	0.92	0.63-1.35	0.64
18.5-23.9	395 (56.67)	1.00	-	-
24.0-27.9	212 (30.42)	0.93	0.76-1.13	0.49
≥ 28	43 (6.17)	1.11	0.76-1.64	0.43
Education				
≤ 6 years	298 (42.75)	1.00	-	-
7-12 years	345 (49.50)	2.56	2.00-3.29	0.26
> 12 years	54 (7.75)	8.81	5.57-13.94	< 0.001
Widowhood (Yes)	271 (38.89)	1.10	0.89-1.37	0.39
Living in the community (no)	34 (4.88)	1.58	0.93-2.67	0.09
Personal monthly income (RMB)				
≤ 3,000	366 (52.51)	2.36	1.77-3.15	< 0.001
3,001-3,900	231 (33.14)	1.39	1.04-1.87	0.37
> 3,900	100 (14.35)	1.00	-	-
Gravidity/Parity (> 2)	204 (29.27)	1.37	1.07-1.75	0.01

Level of education, personal income, gravidity/parity, and diseases were risk factors for UI

Results indicated that the risk factors for UI included advanced age (> 80 years) (OR = 5.90, 95% CI: 4.39-7.93), a high level of education (> 12 years) (OR = 8.81, 95% CI: 5.57-13.94), low personal monthly income (≤ 3,000 RMB) (OR = 2.36, 95% CI: 1.77-3.15), and more gravidity/parity (> 2) (OR = 1.37, 95% CI: 1.07-1.75) ($p < 0.05$, respectively). Moreover, a number of diseases, including COPD (OR = 2.20, 95% CI: 1.22-3.98), dementia (OR = 4.77, 95% CI: 2.15-10.56), and PD (OR = 3.21, 95% CI: 1.42-7.28), were also associated with a higher risk of UI ($p < 0.05$, respectively) (Table 2).

A study conducted in German and Danish populations found that age, BMI, and COPD were associated with UI (*6*). Multiple chronic conditions, diminished cognitive functioning, and less mobility were found to be associated with the incidence of UI (*7,8*). Moreover, a study conducted in Turkey indicated that risk factors may differ according to specific UI subtypes. The key risk factors for urge UI (UUI) are hypertension and diabetes mellitus, and those are hypertension, multiparity, BMI, and low-level of education for stress UI (SUI) (*9*).

Studies have found that multiparity increased the risk of UI (*10*), which was consistent with the results of the current study. However, previous studies found that a low-level of education increased the risk of UI (*11*), which was inconsistent with the current findings. A possible explanation may be that elderly people with a high level education pay more attention to their health and notice UI more readily. A study revealed that elderly people with a higher level of education have more information about UI and feel less stigma than others, so they seek help in a timely manner (*12*).

Women with UI had a more limited scope of activity and negative emotions

Results revealed that women with partial UI or UI had a more limited scope of activity and that the scope decreased with the severity of UI. About 60% of women in the partial UI group engaged in daily activities outdoors, while this figured decreased sharply to 3.6% in the UI group. Moreover, over 80% of women in the UI group engaged in almost no outdoor activities and they could only sit in a wheelchair or lie in bed. Women in the UI group were more likely to have negative emotions, such as depression, anxiety, irritability, or feeling worthless ($p < 0.001$) (Table 3).

A study has indicated that UI has an impact on emotions. UI may be associated with depression among middle-aged and elderly women (*13*). Another study revealed that UI negatively influences ADL, physical and social activities, and emotional disposition (*14*). A previous study reported that the risk of stress and depression in older women with UI was approximately 2 and 1.5 times higher than that in regular women (*15*), which agreed with the current results. The reason may be that leakage of urine and odor leads to embarrassment, causing decreased self-esteem and depression as well as affecting emotions (*16*). Therefore, a holistic strategy is needed for elderly women with UI to alleviate negative emotions and manage depression.

Women with UI and dementia had less ability to convey and understand information

A total of 55 elderly women had no dementia at the beginning of study but had dementia at the end of study. These women consisted of 20 without UI, 15 with partial

Table 3. Scope of activity and negative emotion characteristics of women with UI

Characteristic	Women without UI (n = 2,834)	Women in the partial UI group (n = 642)	Women in the UI group (n = 55)	p
Scope of activity				< 0.001
Outdoor activities	2,276 (80.31)	396 (61.68)	2 (3.64)	
Indoor activities	448 (15.81)	144 (22.43)	7 (12.73)	
Almost no activities	110 (3.88)	102 (15.89)	46 (83.63)	
Depression				< 0.001
Never	2,136 (75.37)	390 (60.75)	14 (25.45)	
Sometimes	692 (24.42)	234 (36.45)	27 (49.10)	
Always	6 (0.21)	18 (2.80)	14 (25.45)	
Tendency to cry				< 0.001
Never	2,415 (85.22)	469 (73.05)	18 (32.73)	
Sometimes	417 (14.71)	165 (25.70)	28 (50.91)	
Always	2 (0.07)	8 (1.25)	9 (16.36)	
More easily angered				< 0.001
Never	2,032 (71.70)	404 (62.93)	15 (27.27)	
Sometimes	789 (27.84)	225 (35.05)	32 (58.18)	
Always	13 (0.46)	13 (2.02)	8 (14.55)	
More anxious				< 0.001
Never	2,230 (78.69)	380 (59.19)	18 (32.73)	
Sometimes	598 (21.10)	247 (38.47)	22 (40.00)	
Always	6 (0.21)	15 (2.34)	15 (27.27)	
Worried for no reason				< 0.001
Never	2,094 (73.89)	341 (53.12)	14 (25.45)	
Sometimes	727 (25.65)	283 (44.08)	30 (54.55)	
Always	13 (0.46)	18 (2.80)	11 (20.00)	
Feeling worthless				< 0.001
Never	778 (27.45)	106 (16.51)	3 (5.45)	
Sometimes	1,591 (56.14)	376 (58.57)	22 (40.00)	
Always	465 (16.41)	160 (24.92)	30 (54.55)	

Table 4. Cognitive characteristics of dementia women with UI

Characteristic	Women without UI (n = 20)	Women in the partial UI group (n = 15)	Women in the UI group (n = 9)	p
Judgment in everyday life				0.02
Yes	13 (65.00)	5 (33.33)	1 (11.11)	
No	7 (35.00)	10 (66.67)	8 (88.89)	
Ability to convey information				0.003
Yes	13 (65.00)	5 (33.33)	0	
No	7 (35.00)	10 (66.67)	9 (100.00)	
Ability to understand information				0.004
Yes	15 (75.00)	10 (66.67)	1 (11.11)	
No	5 (25.00)	5 (33.33)	8 (88.89)	

UI, and 9 with UI. Results revealed that judgment in everyday life, the ability to convey information, and the ability to understand information differed significantly depending on the severity of UI ($p < 0.05$) (Table 4). Women with partial UI and UI exercised less judgment in everyday life and had less ability to convey or understand information. Women in the UI group in particular had no ability to convey information.

To date, few studies have focused on individuals with dementia and UI, leading to heated debate on this topic. A study on patients with Alzheimer's disease (AD) patients indicated that they had a higher risk of suffering UI (*17*). Moreover, UI can be distressing for persons with dementia, so awareness of bladder and bowel services should be increased (*18*). However, a several scholars found that there was no significant correlation between age, cognitive function, depression, anxiety, and dementia and UI (*19*). A previous study found that dementia is associated with cognitive and functional deficits that may affect the urinary system, so they may be risk factors for UI (*20*). Hence, one can conclude that individuals with dementia are at higher risk of developing UI, and a thorough assessment of a person with dementia experiencing incontinence needs to be conducted. Therefore, rapid diagnostic methods need to be explored to decrease the incidence of UI.

In conclusion, screening and early intervention in the population at risk of developing UI is highly necessary since these measures may reduce the impact of UI on the QoL of the elderly. Moreover, more attention needs to be paid to the adverse effects of UI on ADL and mental health due to a limited range of activity and negative emotions in the future.

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[§]These authors contributed equally to this work.

**Address correspondence to:*
Yuhong Niu and Hansheng Ding, Shanghai Health Development Research Center (Shanghai Medical Information Center), No. 602 Jianguo (W) Road, Xuhui District, Shanghai, China 200031.
E-mail: niuyuhong@126.com (YN), dinghansheng@hotmail.com (HD)

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