



Original Article

A community-based epidemiological survey of overactive bladder and voiding dysfunction in female Taiwanese residents aged 40 years and above

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ABSTRACT

Objective: This is part of a three-year study designed to evaluate the natural history of lower urinary tract symptoms in local community residents aged 40 years and above in central Taiwan. We evaluated the prevalence of overactive bladder (OAB) and voiding dysfunction (VD) in female residents using validated questionnaires.**Materials and Methods:** A structured questionnaire containing groups of different questionnaires was translated into Chinese and each one was validated separately. A trained research assistant interviewed the participants and assisted in filling in the questionnaires. Residents were recorded to have OAB if the total OABSS score was ≥ 4 . Urge urinary incontinence (UUI) was defined as urine leakage preceded by the feeling of urgency which is slightly or more distressful. VD was defined as feeling of difficulty in emptying the bladder which is slightly or more distressful.**Results:** A total of 2411 community residents aged 40 years and above who completed all the questionnaires in the initial survey were recruited, of which 1469 (60.9%) were women. The prevalence of OAB, UUI and VD were 33.1%, 26.8% and 28.3% respectively in the female community residents. Age ≥ 60 (OR, 1.5; 95%CI, 1.1–2.0), menopause (OR1.4; 95% CI, 1.0–1.9) and a history of diabetes mellitus (OR, 1.8; 95% CI, 1.2–2.8) were the risk factors for OAB. Age ≥ 60 (OR, 1.4; 95%CI, 1.0–1.9), BMI ≥ 25 (OR, 1.3; 95% CI, 1.0–1.7) and instrument deliveries (OR, 1.5; 95% CI, 1.0–2.1) were the risk factors for VD.**Conclusion:** Our results imply that the prevalence of overactive bladder and voiding difficulty are high in female community residents aged ≥ 40 years in central Taiwan.© 2017 Taiwan Association of Obstetrics & Gynecology. Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Lower urinary tract symptoms (LUTS) and pelvic floor dysfunction are disabling conditions that affect health-related quality of life [1]. The occurrence of these disabling conditions increase with age. In 2002, the International Continence Society (ICS) defined the terminology for pelvic floor dysfunction in women and updated the terminology in 2010 [2,3]. A population survey revealed that lower urinary tract symptoms (LUTS) have currently

become a large economic burden on health services and will continue to be in the future. According to Reeves's report in 2006, a health economic model was created to estimate the burden of overactive bladder (OAB) on health care systems in five European countries [4]. The model estimated that from 2000 to 2020, the number of people over age 40 with symptoms of OAB is expected to rise from 20.2 million to 25.5 million. Seven million people have urge incontinence and this figure is expected to increase to 9 million in 2020. The use of incontinence pads was the largest cost accounting for 63% of the annual per person cost for OAB management. In 2003, we randomly sampled the female population aged 20 years or more to evaluate the prevalence of OAB and urinary incontinence in central Taiwan [5]. However most of the participants were younger in age and the evaluation did not evaluate other LUTS such as voiding difficulty.

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This is a three-year study designed to evaluate the natural history of LUTS in a few local community residents aged ≥ 40 years in Taichung, Taiwan. We evaluated the prevalence of OAB and voiding dysfunction in different genders using validated questionnaires in the first year of this study. We will identify the potential risk factors that were associated with the occurrence of LUTS in these community residents. In this manuscript, we report and analyze the data of the female residents.

Materials and methods

This study was conducted in communities located in the west and south districts of Taichung, Taiwan. This is a three-year prospective longitudinal survey designed to evaluate the prevalence, incidence, remission and symptom progression of lower urinary tract symptoms (LUTS) and pelvic floor dysfunction. From January 2012 to December 2012, community residents aged 40 years and above who attended the community health screening service or community recreation activities were invited to participate in this three-year follow up study. The residents who agreed to participate in this study were asked to fill in a structured questionnaire in the first, second and third years. The structured questionnaire contained groups of different questionnaires that were translated into Chinese and each one was validated separately. Subjective perception of LUTS and impact of QoL were measured by the overactive bladder symptoms scores (OABSS, Homma's version), Urogenital Distress Inventory short form (UDI-6), and The Incontinence Impact questionnaire short form (IIQ-7) questionnaires. The scoring for each item in the UDI-6 is as follows; 0 for "not at all", 1 for "slightly", 2 for "moderately" and 3 for "greatly". The Chinese version of OABSS questionnaire was translated and validated by experts in the Taiwan Continence Society (TCS) in 2008.

A trained research assistant was sent to interview and assist the residents who could not fill in the questionnaires or could not read through and understand the questionnaire, especially women over the age of 65. Residents were recorded as having overactive bladder (OAB) if the OABSS total score was ≥ 4 . The OABSS score ranged from 0 to 15, with higher scores indicating more severe symptoms. Urge urinary incontinence (UUI) was defined as urine leakage preceded by the feeling of urgency which is slightly or more distressful (UDI-6 scoring; ≥ 1). Voiding dysfunction (VD) was defined as feeling difficulty in emptying the bladder which is slightly or more distressful (UDI-6 scoring; ≥ 1).

Descriptive statistics were performed to evaluate the prevalence of LUTS in female community residents. Student's *t* test was used to evaluate the means of continuous variables between groups. Multivariable logistic regression analysis was performed to consider the effect of all potential risk factors associated with LUTS. A *P* value less than 0.05 was considered as a significant difference. SAS software version 9.4 (SAS Institute, Inc., Cary NC, USA) was used for the data analysis. The study protocol was approved by the Chung Shan Medical University Hospital Institutional Review Board and was sponsored by Chung Shan Medical University Hospital (CSH-2012-A-020).

Results

A total of 2411 community residents aged 40 years and above who completed all questionnaires in the first year survey were recruited, of which 1469 (60.9%) were women. The baseline characteristics of the study subjects are shown in Table 1. The highest number of participants was the 50–59 years-old (36.4%) female birth cohort. The number of participants in the birth cohort of ≥ 70 years (14.6%) was the lowest. Most of the women were unemployed

Table 1

Baseline characteristics of female community residents (n = 1469).

Characteristic	N (%)
Age	
40–49 years	390 (26.6)
50–59 years	535 (36.4)
60–69 years	329 (22.4)
≥ 70 years	215 (14.6)
Employment status	
Unemployed	865 (58.9)
Employed	603 (41.1)
Education Level	
< High School	612 (41.7)
High School	509 (34.7)
College	347 (23.6)
Income (yearly)	
Low (<NT200 thousand)	393 (27)
Medium (NT200–800 thousand)	824 (56.5)
High (>NT800 thousand)	240 (16.5)
Body mass index (mean; kg/m ²)	24.6 \pm 3.0
Diabetes mellitus	91 (6.7)
Parity (median) (range)	2 (0–9)
Menstrual status	
Premenopause	471 (32.2)
Menopausal	993 (67.8)
Instrumental deliveries (forceps + vacuum)	147 (10)
Cesarean section	251 (17.1)
Previous gynecologic surgery	475 (32.3)

Denominators differ due to missing data.

with low to medium yearly income. The median parity of the female participants was 2 (range 0–9). Two hundred and fifty one (17.1%) women had at least one cesarean section and 475 (32.3%) women had previous gynecologic surgery. There were 993 (67.8%) women with menopausal status.

The prevalence of OAB and urge urinary incontinence was 33.1% and 26.8% respectively in female community residents (Table 2). The prevalence of voiding dysfunction was 28.3%. The prevalence of OAB increased with age (Table 3). The prevalence of OAB in the 60–69 year-old cohort (41.6%) and ≥ 70 year-old cohort (49.8%) were significantly higher than the younger age groups. The potential risk factors that might predispose the community residents to the occurrence of overactive bladder and voiding difficulty were analyzed. For the female residents, age ≥ 60 (OR, 1.5; 95% CI, 1.1–2.0), menopause (OR 1.4; 95% CI, 1.0–1.9) and a history of diabetes mellitus (OR, 1.8; 95% CI, 1.2–2.8) were the risk factors for overactive bladder (Table 4). Age ≥ 60 (OR, 1.4; 95% CI, 1.0–1.9), BMI ≥ 25 (OR, 1.3; 95% CI, 1.0–1.7) and instrumental deliveries (OR, 1.5; 95% CI, 1.0–2.1) were the risk factors for voiding difficulty.

Table 2

The prevalence of lower urinary tract symptoms in female community residents (n = 1469).

LUTS	Cases n	%
SUI	686	46.7
UUI	394	26.8
MUI	311	21.2
OAB	486	33.1
VD	416	28.3
OABSS		
0–3	983	66.9
4–7	373	25.4
8–15	113	7.7

LUTS, lower urinary tract symptoms; SUI, stress urinary incontinence.

UUI, urge urinary incontinence; MUI, mixed urinary incontinence.

OAB, overactive bladder; VD, voiding difficulty.

OABSS, Overactive bladder symptom score.

Table 3

Prevalence of overactive bladder by birth cohort.

Age group	n	%
40–49	83	21.3
50–59	159	29.7
60–69	137	41.6
≥70	107	49.8
P value		<0.001 ^a

Overactive bladder(OAB) was defined as OABSS≥4.

^a Cochran-Armitage trend test and chi-square test for prevalence of OAB among different age groups.**Table 4**

Factors associated with overactive bladder and voiding difficulty in female residents.

	^b Overactive bladder ^a OR 95%CI	^c Voiding difficulty OR 95%CI
Age ≥ 60	1.51 1.12–2.04*	1.41 1.03–1.93*
BMI ≥ 25	1.27 0.99–1.63	1.34 1.04–1.73*
Parities > 2	0.97 0.75–1.25	0.94 0.72–1.22
Cesarean section	0.77 0.52–1.14	1.18 0.79–1.75
Instrumental deliveries	1.36 0.94–1.96	1.47 1.01–2.13*
Menopause	1.39 1.02–1.90*	1.33 0.97–1.83
Diabetes mellitus	1.81 1.18–2.78*	1.30 0.82–2.05

*P < 0.05.

^a Odds ratio and confidence interval are derived from multivariate logistic regression analysis.^b Overactive bladder was defined as OABSS≥4.^c Voiding difficulty was defined as UDI6-5≥1.

Discussion

In our previous study, the prevalence of overactive bladder as defined by a single symptom or combination of urgency, urinary frequency, nocturia or urgency incontinence was 34.8% in community women aged 20 years or more in central Taiwan [6]. In our present study, OAB was defined as OABSS≥4, and the prevalence was 33.1% in community women aged 40 years and above. The OAB symptom score (OABSS) used in this study was developed by Homma et al. [7]. The OABSS is the sum score of four symptoms including, daytime frequency, nighttime frequency, urgency and urgency incontinence. According to Homma's study, patients with OAB had an OABSS score distribution from 4 to 15 with high reliability and sensitivity to therapeutic effects. As indicated before, the Chinese version of the OABSS questionnaire was translated and validated in Taiwan in 2008 [8]. We believe that the OABSS is a reliable tool to detect OAB in the community setting because OAB syndrome is defined by symptoms and patients with OAB may have complex changes, with symptoms of remission and progression. In a Japanese epidemiological survey, the prevalence of OAB which was defined as eight or more voids/day and one or more urgency episodes/week was 11% in women aged ≥40 years [9]. Another epidemiological survey of the prevalence of OAB which was carried out in Henan province of China, involved 6676 female community residents aged ≥40 years [10]. The OABSS questionnaire used for evaluation was similar to the questionnaire in our present study. However the diagnostic criteria for OAB was stricter with the requirement of an urgency score of ≥2 and a total score of at least 3 on the OABSS. The prevalence of OAB for female residents was 1.9%, which was the lowest compared with our present study and previous studies [1,6,9]. The prevalence of OAB in women is difficult to compare among studies due to different definitions and study populations.

In our present study, the prevalence of urge urinary incontinence was 26.8% in the community women aged 40 years and above. Urge urinary incontinence was defined as urine leakage

preceded by the feeling of urgency which is slightly or more distressful. This is much higher than the prevalence (9.1%) in our previous study which involved community women aged 20 years or more [6]. Our study also found that the prevalence of OAB increased with advancing age and this finding was consistent with other studies [1,5,9]. OAB significantly increased from 21.3% in women 40–49 years of age up to 49.8% in women older than 70 in our study. OAB is a symptom syndrome in which urgency is the core symptom, usually accompanied by frequency and nocturia, with or without urge urinary incontinence [2]. The prevalence of OAB wet (OAB with urge urinary incontinence) also increases gradually with age as shown in previous studies [6,11]. Some risk factors have been shown to increase the prevalence of OAB, such as race, aging, menopause, pelvic organ prolapse, obesity and incontinence surgery etc. [12]. In our study, age ≥60, menopause and diabetes mellitus were found to be the predisposing factors for OAB after using multiple logistic regression analysis. Menopause estrogen deficiency may cause urogenital atrophy that aggravates lower urinary tract symptoms such as frequency, urgency, nocturia and urinary incontinence [13]. However, the use of estrogen therapy in the treatment of urgency and urge urinary incontinence is still controversial. Cardozo et al. reported a double-blind, placebo-controlled study, evaluating the used of oral estriol in women with urge incontinence [14]. Although there was improvement in symptoms of urgency and urge incontinence in both groups, there was no significant improvement compared with the placebo group. Another systematic review of literature analyzed the effects of estrogen for symptoms suggestive of overactive bladder [15]. The results showed that local estrogen therapies had statistically significant beneficial effects on all outcome variables.

Voiding dysfunction (VD) may be due to abnormal detrusor and/or urethral function. These were well defined by the Standardization Sub-committee of the International Continence Society in 2002 [2]. Women with voiding dysfunction may present with symptoms such as hesitancy, slow urinary stream, intermittency, straining to void, feeling of incomplete emptying, etc. Voiding dysfunction is common among the elderly; however it's prevalence in community female residents has seldom been evaluated. In our present study, voiding dysfunction was defined as feeling of difficulty in emptying the bladder which is slightly or more distressful. The prevalence of voiding dysfunction in community women was 28.3% in our study. Choi et al. conducted a prospective, multi-center study in Korea to investigate the prevalence of voiding dysfunction [16]. 12.8% of female patients with LUTS who visited the urology department were diagnosed with voiding difficulty after urodynamic examination. Another study reported 6.5% of female patients in a single medical center had urodynamic diagnosed bladder outlet obstruction [17]. A population-based survey conducted in five European countries estimated the prevalence of LUTS among both genders [18]. Men reported having voiding and post-micturition symptoms more frequently than women. 12.3% of the women reported the symptom of incomplete emptying and 9.9% reported terminal dribble. It has been found that the voiding LUTS are less common than the storage LUTS in other studies [19]. In our present study, the prevalence of voiding dysfunction was lower than the prevalence of stress urinary incontinence and OAB but was higher than urge urinary incontinence and mixed incontinence in community women aged 40 years and above. We suggest that voiding dysfunction should gain equal attention as urinary incontinence and OAB do among female community residents.

There are limitations in the current study. The first limitation is the recall bias related to the use of a self-report questionnaire to evaluate LUTS in community residents. Besides, Observation bias was also a concerned in this study. The results of the data may also

contain difference between the self-administered questionnaire and the assisted questionnaire filled in by a research assistant. The second limitation is that the community residents are not randomly selected from the national census record. The participants were selected from residents who attended the community activity. Older residents or those with poor access who did not attend the community activity may have more severe LUTS and were not evaluated in this study.

In conclusion, our study revealed that the prevalence of overactive bladder and voiding dysfunction in female community residents aged ≥ 40 years in central Taiwan are high. Aging (age ≥ 60) is a risk factors for both OAB and voiding dysfunction. Our study provides important information because the elderly population in Taiwan is growing. The aging society may cause increasing health care and financial burdens within the next 10–20 years. It is important to understand the epidemiology of LUTS in community residents to improve health care policies and intervention strategies in the future.

Conflicts of interest

There is no conflict of interest.

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