

Risk Factors for Urinary Incontinence of Different Severities in Taiwanese Women in the Taipei Area

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OBJECTIVES: To detect the risk factors for urinary incontinence (UI) of different severities in Taiwanese women in the Taipei area.

MATERIALS AND METHODS: A multistage sampling questionnaire interview was performed in which 1608 women aged older than 20 years were selected from 1 urban and 2 rural areas in Taipei and were interviewed in person. The women were questioned concerning their demographic characteristics and status of incontinence. Effects of possible risk factors for UI were estimated by multiple logistic regression.

RESULTS: Of the total, 205 interviewees (12.7%) who had experienced urine leakage at least once per month in the preceding 12 months were regarded as being incontinent in our study; 146 subjects (9%) were further categorized as having clinically significant UI. The presence of clinically significant UI was positively associated with increased age (aged 65 years or older), the number of normal spontaneous deliveries (NSDs) greater than 2, and a history of a pelvic operation. Our study also showed that neither obesity (high BMI) nor educational level was a risk factor for UI.

CONCLUSIONS: Despite the high prevalence of UI among community-dwelling women in the Taipei area, most of the cases were mild. Among the possible risk factors we investigated, aging, the number of NSDs, and a history of a pelvic operation constituted the significant determinants for the presence of UI. (*J Urol R.O.C.*, 13:32-37, 2002)

Key words: urinary incontinence, female, risk factors.

INTRODUCTION

Urinary incontinence (UI), defined as a condition in which involuntary loss of urine is objectively demonstrable, has long been a social or hygienic problem [1]. It is a very common problem which occurs mainly in elderly women [2-9]. Depending on the population surveyed and the definition adopted, the prevalence rate varies from 4.5% to 53% for female incontinence [10]. Being non-fatal and usually mild, this problem is seldom paid the proper attention. However it can cause embarrassment and inconvenience which affects the quality of life of its sufferers [9,11]. Advanced age and high parity were found to be risk factors for UI [11-12]. Our previous study on community-dwelling women in the Taipei area further identified age, the number of spontaneous abortions, and maternal incontinence as significant predictors [13]. However, as found in all previous studies [2-11], most cases of female UI are mild and tolerable no need to seek health care. No stud-

ies have focused on risk factors of clinically significant UI, which can affect the quality of life to a certain degree and cause people with this condition to seek health care intervention.

In this study we present the results of a cross-sectional survey of 1608 community-dwelling women in Taipei area who received a personal interview. We determined possible risk factors and analyzed their effects on UI of different severities.

MATERIALS AND METHODS

A sample of 2500 aged 20 years and older (10 from each neighborhood in a total of 250 neighborhoods according to the Household Registration Offices), was selected through a multistage sampling from 58,066 adult women in the Chung-Cheng District of the Taipei Metropolitan area and 20,825 from 2 rural areas (Chinshan and Kungliao townships) of Taipei County. Each of the selected women was asked for her consent and

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was interviewed in person by trained female college students between May 1998 and June 1999. Women were selected according to their addresses, and selection was unrelated to the presence of UI. The demographic characteristics (age, education, body weight, height, etc.) and birth histories, especially the number of spontaneous vaginal deliveries (NSDs), were taken first. We also enquired about their major medical history including previous pelvic operations and major neurological problems (diabetes, cerebral vascular accidents, parkinsonism, etc.). A history of cesarean section was not included. The status of urine loss in the preceding 12 months was recorded with respect to frequency, amount, duration, and types.

Definitions of incontinence variables

Women who had occasional urine leakage of less than once per month were considered to have transient incontinence [14] and were not considered to be incontinent. The frequency of urine loss was further divided into 3 categories: (1) more than once a month; (2) 1 or several times a week; and (3) almost everyday. The quantity of urine leakage was divided into 3 levels: (1) a few drops; (2) wetting the pants, but requiring only one or fewer changes of pants per day; and (3) complete wetting, requiring two or more changes of pants per day, or diapers were used instead. The severity of UI was expressed by a severity index (SI), which was obtained by multiplying the frequency and quantity [15]. Based on the calculated SI, urine leakage was classified as mild (SI=1), moderate (SI=2, 3, or 4), or severe (SI=6 or 9).

The type of UI was further assessed by the subject's description of how urinary loss occurred. This was divided into 4 conventional types: stress, urge, mixed, or others [3].

Any positive answers to the questions concerning the presence, frequency, type, onset, duration, and treatment were subjected to further analysis. Mild UI with a severity index of 1 was classified as the normal group with the rest classified as either transient or no UI. UI with a severity index of ≥ 2 was defined as clinically significant UI. Age, education level, body mass index (BMI, kg/m² height), NSDs, and pelvic operation and menstrual histories were collected as possible risk factors.

Statistical analysis

Multiple logistic regression (proc logistic of the SAS package) [16] was used to assess the effects of possible risk factors. A value of $p < 0.05$ was defined as statistically significant.

RESULTS

Of the 2500 women selected, 1608 (64.3%) of them responded. Response rates were similar for different areas. The age distribution of the women interviewed was similar to that of women registered in those areas. The response rate of younger women (< 45 years) was lower than that of the other age groups, so younger women were under-represented.

A total of 472 of the 1608 subjects (29.3%) had experienced some degree of urine leakage in the preceding 12 months. However, only 205 subjects (12.7%) who complained of UI more than once monthly were considered incontinent. Based on the derived severity index, 59 women had mild, 86 had moderate, and 60 had severe UI. For further analysis of risk factors, women with mild UI, together with those who had transient or those without UI were collectively categorized as the normal group and constituted a total of 1462 subjects while the remaining 146 were classified in the clinically significant UI group according to the severity index. The UI types and severity of the 205 incontinent women are shown in Table 1. Stress UI (56.6%) was the most common type encountered. Of the 146 women with clinically significant UI, 72 (49.3%) were classified as having stress UI, 28 (19.1%) as having urge UI, 41 (28.1%) as having mixed UI, while the rest 5 (3.5%) as having others. As to the onset and duration of incontinence, 47.1% of them had insidious onset, and 22.6% experienced it after childbirth; 77% of them had had UI for less than 5 years.

The distributions of urinary incontinence of the normal and clinically significant UI groups across potential risk factors are depicted in Table 2. For the 146 patients who had clinical UI, their BMI distribution was within a normal range in which 122 (91%) of subjects had a BMI of < 27.5 ; and 70.5% of the women with UI had > 2 NSDs.

In the analysis of risk factors for clinically significant UI shown in Table 3, the risk factors of increased age, greater than 2 NSDs and a history of a pelvis operation were positively associated with clinical UI. Other possible risk factors showed no significant asso-

Table 1. Types and severity of incontinence of 205 women

Items	Number	Percentage
Frequency		
1=more than once per month	108	52.7
2=more than once per week	65	31.7
3=almost every day	32	15.6
Quantity		
1=a few drops	96	46.8
2=wet pants, requiring less than 1 change of pants per day	95	38.7
3=wet, requiring more than 1 change of pants per day	14	14.5
Severity		
Mild (SI = 1)	59	28.7
Moderate (SI = 2, 3, 4)	86	42.0
Severe (SI = 6, 9)	60	29.3
Type		
Stress	116	56.6
Urge	37	18.0
Mixed	47	22.9
Other ^a	5	2.4

^a Others indicate overflow incontinence and other uncategorizable types of UI.

Table 2. Basic demographics of the normal and clinical UI groups across possible risk factors

Item	No.	
	Normal (N = 1462)	Clinical (N = 146)
Age (years)		
< 45	311	3
45-54	492	48
55-64	436	49
≥65	223	46
Body mass index (BMI)		
< 22.5	736	54
22.5-27.5	595	68
> 27.5	131	24
Educational level		
Less than high school	563	80
High school	476	36
College	423	30
Parity (NSD)		
0	351	11
1	120	5
2	298	27
> 2	693	103
Menstruation ^a		
Yes	745	45
No	717	101
Pelvic operation		
No	1300	116
Yes	162	30

^a Menstruation is defined as self-reported menstruation or age \leq 55 years.

ciation with the presence of clinical UI after adjusting for other factors in the model. A history of medical diseases was not included in the analysis because of incomplete answers provided by most of the interviewees.

DISCUSSION

The prevalence and distribution of characteristics of UI detected in this study are similar to those reported by previous studies [2-8,12]. Changing answers for different questions addressing the presence and characteristics of UI supports the possibility that UI is an ill-defined, embarrassing problem for which most patients might feel hesitant and reluctant to report their condition [11,13,14]. Fortunately, fewer than 1/10 of the women had suffered from clinically significant UI. Chinese women might be more conservative towards and tolerant of this non-life-threatening voiding symptom or might not properly look into the problem. Sometimes they are shy about discussing the problems with strangers, even with health-care providers. More public education and communication are needed to educate women to face their problems and seek appropriate care. For better prevention, more research is mandatory to investigate their perceptions and attitudes towards the disease which may strongly affect their inclination to seek treatment.

Table 3. Multivariate odds ratios of risk factors determining urinary incontinence

Variable	OR	95 % CI
Age		
< 45 years	1 (reference)	
45-54 years	8.15*	2.00-23.26
55-64 years	7.27*	1.59-33.15
≥ 65 years	12.69*	2.74-58.72
Educational level		
Elementary and below	1 (reference)	
High school	0.88	0.56-1.36
College and above	1.24	0.74-2.75
Body mass index (BMI)		
< 22.5	1 (reference)	
22.5-27.5	1.12	0.76-1.65
≥ 27.5	1.61	0.94-2.75
NSDs		
≤ 2	1 (reference)	
> 2	1.64*	1.04-4.52
Pelvic operation		
No	1 (reference)	
Yes	1.56*	1.00-2.43
Menstruation		
No	1 (reference)	
Yes	1.04	0.42-2.58

* $p < 0.05$ compared to continent women, by multiple logistic regression (proc logistic of the SAS package).

To reduce the biases caused by age and area distribution, multi-stage sampling was used in this study. The response rate was acceptable (64.3%), and only women younger than 45 years were under-represented because of a lower response rate. The major reason for non-response was being absent during daytime because of having to work when the interviews were conducted, as less than 5% refused the interview. In this study, we used a 'severity index' as an indicator of the severity of UI. An integration of frequency and amount may provide a better description of the severity of UI, as it is likely that women with frequent UI do not suffer as much when urine loss is of a small volume. Similarly, women with a larger amount of urine loss might not seek help if it only occurs infrequently. Therefore, severity indicated by the severity index might serve as a better indicator. Sandvik et al. [15] validated the severity index against a 48-hour pad test and concluded that the severity index might be a useful tool for assessing the severity of urinary incontinence in epidemiological surveys.

The positive association of age in this study further justifies the results of previous reports in which age was found to be an important predictor of UI [2-9]. The lower urinary tract changes with age, even in the absence of disease. Bladder contractility and capacity and the ability to postpone voiding appear to decline in both sexes, whereas urethral length and maximal closure pressure probably decline with age in women [17-18]. In addition, decreases in adequate mentality, mobility, motivation, and manual dexterity are almost inevitable in

the elderly which may exacerbate the condition of urinary incontinence. The OR of menopausal status was found to be insignificant in the multivariate analysis because of the high correlation between menstruation status and age.

We have identified the number of NSDs as the major reproductive risk factor for UI and discussed the possible mechanism in our previous study [12]. The findings of this study further confirm the possibility by analyzing clinically significant UI. When the effects of other factors are all removed, the effect of the number of NSDs remains. Multiple vaginal deliveries may cause repeated stretching of the pelvic musculofascial tissue and weakening of the periurethral support. Abortions may have a similar effect. We did not include a question on abortion because we thought it might be a painful memory for subjects receiving an interview or a health examination. We also did not include cesarean section in this study as it is thought to produce less of a disturbance to the periurethral tissue, and hence the chance of developing UI does not increase [19-20]. Identifying those in the high-risk group as early as possible is necessary for prevention as well as early detection and treatment of clinically significant UI. The risk of a pelvic operation for developing UI proved to be significant in our study, as was shown in other series [21-23].

Wetle et al. found a negative correlation of education to the presence of UI in elderly people [9]. Women with higher education are usually assumed to have better knowledge of the human anatomy. They might also be more aware of their own health, sensitive to minor symptoms, and capable of overcoming embarrassment to report their illness. However in our multivariate analysis, we failed to find such a negative relationship.

Similar to our previous study on community-dwelling women [12], we found only a moderate and non-significant increase in risk for women with a higher BMI. It is possible that women receiving a health examination might have, compared with their counterparts in the community, a wider range of BMI values and an inadequate number of higher BMI categories. The lack of an association of BMI with clinically significant UI implies that this factor might not affect a woman's daily life. In spite of the insignificant results, a higher BMI is still discouraged as obesity is related to higher abdominal pressures and can cause mild UI. It can also induce some chronic medical conditions related to UI, such as diabetes and cerebrovascular accidents. We attempted to correlate these diseases to the risk factors for UI. However due to incomplete answers provided by most of the interviewees, we were unable to analyze their effects on UI. Possible explanations are that either some elderly who live in the community have never been aware of these problems (e.g., diabetes) or that some of the selected elderly afflicted with these problems (e.g., senile dementia or cerebral vascular accident) were in the non-responder group. Further studies are needed to clarify these questions and avoid such biases.

CONCLUSIONS

UI is a potential problem among community-dwelling women in Taipei areas, although most cases were mild. The presence of clinically significant UI was significantly associated with increased age, the number of NSDs, and a history of a previous pelvic operation. Better education of the high-risk group may help them recognize the problem and further aid in the prevention of this entity.

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