

# RISK FACTORS OF URINARY FREQUENCY AMONG WOMEN AGED 60 AND OLDER IN TAIWAN

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## SUMMARY

**Objective:** To assess the associated risk factors for daytime urinary frequency among Taiwanese women aged  $\geq 60$  years.

**Materials and Methods:** Daytime urinary frequency, defined by the International Continence Society, and its associated problems were evaluated, and medical history and sociodemographic variables were recorded. A total of 2,410 women were selected by a multistage random sampling method. The factors were assessed by frequency and Pearson's  $\chi^2$  test using a significance level of  $< 0.05$ .

**Results:** A total of 621 women of those initially selected in the study died before completion of this study. Face-to-face interviews with 1,521 women were completed, producing a response rate of 85.0% (1,521/1,789 women). The prevalence of daytime urinary frequency was significantly related to body mass index ( $p = 0.018$ ), diabetes mellitus ( $p = 0.017$ ), hypertension ( $p = 0.015$ ), previous drug allergy ( $p = 0.003$ ), smoking ( $p = 0.005$ ), hormone therapy ( $p = 0.019$ ), parity ( $p = 0.019$ ), and urinary incontinence ( $p = 0.000$ ). However, there was no association between urinary frequency and previous gynecologic surgery, hysterectomy, alcohol consumption, marital status, childbirth, and age of menopause.

**Conclusion:** The results of this study showed a relatively high risk of urinary frequency development in patients with urinary incontinence, diabetes mellitus, hypertension, obesity, and smoking that are preventable, modifiable, or controllable. Better quality of health education for these women, drawing their attention to the associated factors, may have an impact on the prevalence of urinary frequency. [*Taiwan J Obstet Gynecol* 2010;49(3): 260–265]

**Key Words:** lower urinary tract symptoms, risk factors, urinary frequency

## Introduction

Urinary frequency is a common symptom in women of all ages and has a significant impact on the patient's quality of life (QoL) and work. Previous studies have reported that the prevalence of urinary frequency in Taiwanese women aged 20–59 years and  $\geq 60$  years were 5.2% and 18.8%, respectively [1,2]. In addition, the



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risk factors for urinary frequency in Taiwanese women of 20–59-years-old have been reported to include diabetes mellitus (DM), hypertension (H/T), and previous gynecological surgery [3]. However, to our knowledge, there have been very few studies in the literature that have assessed the prevalence or risk factors of urinary frequency.

The data of risk factors for urinary frequency in elderly Taiwanese women was not available. This study was conducted to evaluate the risk factors for urinary frequency in Taiwanese women aged  $\geq 60$  years. The definition of urinary frequency or daytime frequency was that recommended by the International Continence Society (ICS) in 2002 [4]. The definition of “increased daytime frequency” presented by the ICS is that the patient complains of having to void too often during the day. It is a subjective lower urinary tract symptom (LUTS) as perceived by the patient, caregiver, or partner. Frequency, as used in this study, was adapted from the ICS definition.

## Materials and Methods

The study was part of the 1999 “Survey of Health and Living Status of the Middle Aged and Elderly in Taiwan”, which is conducted by the National Institute of Family Planning (NIFP; Department of Health, The Executive Yuan, Taiwan) to evaluate the prevalence and determine the associated factors regarding daytime urinary frequency and other LUTS among Taiwanese women aged  $\geq 60$  years. The third follow-up study of the 1989 survey was completed in 1996, and the 1999 study was a follow-up survey of both of those cohorts. This study included 1,755 women from the first cohort aged  $\geq 70$  years and 655 women from the second cohort, aged 60–69 years.

This study was conducted in Taiwan between July 1999 and December 2000. There were an estimated 1.25 million women aged  $\geq 60$  years in 1999. In coordination with the NIFP, supervised by the Population Studies Center (University of Michigan, Michigan, MI, USA), the samples were selected using a multistage random sampling design. The survey utilized a three-stage selection process, in which 56 townships were selected proportional in size to the 331 townships in Taiwan, which were arranged into 27 strata. Within townships, blocks formed the second stage, selected proportional to size, and within each block two eligible respondents were selected randomly, utilizing the household register of each sampled township as a sampling frame. Those who no longer lived at their registered addresses were traced to their new residence.

All the survey procedures, including design and draft of questionnaire, pretest and revision, sampling design and operation, recruiting and training of interviewers, interview fieldwork, questionnaire editing and correcting, test-retest, and data coding, cleaning, and analysis, were arranged by the NIFP. A committee was organized by the NIFP in order to review and approve the protocols for this study. About 100 interviewers attended a 3-day training, which included training for standard procedures for conducting interviews, questionnaire contents, and interview-related skills. There was a summary assessment for the interviewers. Only those who were qualified could conduct field interviews.

To increase the measurement accuracy of the survey questionnaire prior to the formal implementation of the survey, staff of the NIFP conducted three trial surveys using a preliminary draft of the questionnaire. The final questionnaire was completed following numerous discussions and edits based on the opinions provided by domestic and foreign experts and scholars.

Within 4–6 months of selection, the women selected were interviewed face-to-face at their home by well-trained professional NIFP interviewers. During the interviews, the interviewers had to explain the purposes of the study and the questionnaire to the interviewees. In addition, the participants had to fully understand the aims of the study because they had to answer the questionnaire themselves. Thus, for those potential respondents who were identified as severely ill, deaf or hard of hearing, mute, having cognitive disorder, having difficulties in communication, or being too sad to communicate were excluded from the study. The questionnaire was devised to cover five areas: general background, medical history, obstetric and gynecological history, daytime urinary frequency, and other LUTS. The questionnaire used in this study was modified from the “URG-database system. Urodynamics and gynecologic urology. HISTORY” [5].

Urinary frequency was considered to be present when a respondent answered “yes” to the question, “Do you consider you void too often during the day?” Interviewees who did not answer this question were excluded from the study. Analysis of the individual items was based only on the number of subjects who answered those particular questions. Interviewees who did not answer this question were excluded from the study.

All data were analyzed using SAS (SAS Institute, Cary, NC, USA). Subjects were classified into two categorical response variables to construct a two-way contingency table. The multinomial sampling distribution was assumed for each table. Response probabilities were estimated by relative frequencies. The Pearson  $\chi^2$  test was used to test the null hypothesis of no association

between the row variable and the column variable for each two-way table. A two-sided alternative hypothesis was considered for each Pearson  $\chi^2$  test. Hence, if a test was statistically significant, the row variable and the column variable can be either positive or negatively correlated for a  $2 \times 2$  table. However, we can check the estimates of response probabilities to find the correct relationship. A  $p$  value of  $\leq 0.05$  was regarded as statistically significant.

## Results

Of the 2,410 women selected by the multistage random sampling design, 621 women of those initially selected died before completion of this study, 1,521 women were

successfully interviewed and included in this study, producing a response rate of 85.0% (1,521/1,789 women). In this study, 268 women refused to the interview, could not be found, or did not answer the questionnaire.

Table 1 shows that urinary frequency was more prevalent among women who suffered from DM, H/T, drug allergy, and urinary incontinence (UI). In addition, women who smoked or had undergone hormone therapy were more likely to report urinary frequency than those who had not.

Among the women in the sample, the body mass index (BMI) of 49.5% (703/1,420) of interviewees was within the normal range of Taiwanese women aged  $\geq 60$  years (Table 2). Further, BMI was also an identified urinary frequency risk factor in Taiwanese women of that age.

**Table 1.** Prevalence of daytime urinary frequency by medical histories in 1,521 women

Group	Daytime frequency, $n$ (%)	Number missing*	Pearson's $\chi^2$	Degrees of freedom	$p$
Diabetes mellitus		2	5.678	1	0.017
Yes	62/257 (24.1)				
No	224/1,262 (17.7)				
Hypertension		0	5.958	1	0.015
Yes	131/600 (21.8)				
No	155/921 (16.8)				
Previous drug allergy		1	8.952	1	0.003
Yes	46/169 (27.2)				
No	239/1,351 (17.7)				
Smoking		1	7.742	1	0.005
Yes	20/62 (32.3)				
No	265/1,458 (18.2)				
Hormone therapy		1	5.538	1	0.019
Yes	17/55 (30.9)				
No	268/1,465 (18.3)				
Urinary incontinence		0	140.606	1	0.000
Yes	104/217 (47.9)				
No	182/1,304 (14.0)				

\*Number of interviewees missing in each group.

**Table 2.** Prevalence of daytime urinary frequency by body mass index in 1,521 women\*

Group	$n$	Daytime frequency, $n$ (%)	Pearson's $\chi^2$	Degrees of freedom	$p$
Body mass index					
< 18.5	113	29 (25.7)			
18.5–23	703	123 (17.5)			
24–26	366	64 (17.5)			
27–29	160	33 (20.6)	13.706	5	0.018
30–34	69	16 (23.2)			
$\geq 35$	9	5 (55.6)			
Total	1,420	270 (19.0)			

\*Of the 1,521 respondents, 101 women were missing.

**Table 3.** Prevalence of daytime urinary frequency by parity in 1,521 women\*

	Parity											Pearson's $\chi^2$	Degrees of freedom	p	
	0	1	2	3	4	5	6	7	8	9	10				>10
Daytime urinary frequency, n (%)	9/37 (24.3)	12/49 (24.5)	16/83 (19.3)	22/125 (17.6)	42/281 (14.9)	37/268 (13.8)	57/250 (22.8)	39/162 (24.1)	24/137 (17.5)	8/66 (12.1)	10/31 (32.3)	9/30 (30.0)	22.846	11	0.019

\*Of the 1,521 interviewees, 2 women were missing.

As a whole, this study found that the prevalence of daytime urinary frequency had a positive association with parity (Table 3), and was even negatively associated with parity when it was less than six.

Table 4 shows that the prevalence of urinary frequency cannot be demonstrated as statistically significant among women who had a history of gynecological surgery, childbirth, or hysterectomy. Furthermore, alcohol consumption, marriage, and age of menopause did not significantly increase the risk of frequency.

## Discussion

This survey is the first nationwide epidemiological study of urinary frequency and its risk factors using population-based multistage random sampling in Taiwanese women aged  $\geq 60$  years. Although urinary frequency is a common symptom in women of all ages, there are many underlying causes making it difficult to target investigations appropriately, particularly in the elderly. Also, frequency is a subjective description given during the subjects' interviews and the severity of frequency fluctuated. Previously, both of these factors have made it difficult to estimate the risk factors associated with frequency. However, in accordance with the definition of frequency recommended by the ICS, it may be significant to investigate the impact of socio-demographic, medical, and gynecological factors on the prevalence of urinary frequency in postmenopausal women.

A previous study reported that the prevalence of urinary frequency in Taiwanese women aged  $\geq 60$  years was 18.8% and age was a risk factor of urinary frequency [2]. In an epidemiological study, Bungay et al [6] investigated the prevalence of various LUTS in 1,120 women aged 30–65 years and reported that the prevalence of frequency did not significantly increase with age. In addition, a previous report on the prevalence of urinary frequency in the survey of Taiwanese women aged 20–59 years did not reveal the same result as this study. The fact that age is a risk factor in urinary frequency for the elderly but is not a factor for young women needs further investigation.

Similar to the risk factors for urinary frequency in Taiwanese women aged 20–59 years [3], DM and H/T were significantly related to the incidence of frequency in this study. In addition to UI, previous drug allergies, smoking, hormone therapy, and BMI were also associated with the prevalence of frequency in the elderly group. Nevertheless, the latter four factors were not identified to be urinary frequency risk factors in Taiwanese women aged 20–59 years. These findings

**Table 4.** Prevalence of daytime urinary frequency by previous gynecologic surgery, alcohol consumption, marital status, childbirth, hysterectomy, and age of menopause in 1,521 women

Group	Daytime frequency, <i>n</i> (%)	Number missing*	Pearson's $\chi^2$	Degrees of freedom	<i>p</i>
Previous gynecologic		0	3.257	1	0.071
Surgery					
Yes	40/167 (24.0)				
No	246/1,354 (18.2)				
Alcohol consumption		2	0.015	1	0.902
Yes	12/66 (18.2)				
No	273/1,453 (18.8)				
Married		18	0.210	1	0.647
Yes	279/1,495 (18.7)				
No	2/8 (25.0)				
Childbirth		2	0.770	1	0.380
Yes	276/1,482 (18.6)				
No	9/37 (24.3)				
Hysterectomy		3	2.442	1	0.118
Yes	32/134 (23.9)				
No	254/1,384 (18.4)				
Age of menopause (yr)		105	2.983	5	0.703
20–29	0/4 (0)				
30–39	9/39 (23.1)				
40–49	93/530 (17.5)				
50–59	157/823 (19.1)				
60–69	2/19 (10.5)				
70–79	0/1 (0)				

\*Number of interviewees missing in each group.

require further confirmation, and possible mechanisms that would explain these associations also require further investigation.

Frequency and nocturia are similar complaints by patients who consider themselves to void too often. A previous study on risk factors associated with nocturia in Taiwanese women aged  $\geq 60$  years reported that age, DM, H/T, prior drug allergy, and UI were risk factors for nocturia [7]. The current study did find a significant association between these five factors and urinary frequency. However, these studies showed that marriage, prior gynecologic surgery, alcohol consumption, hysterectomy, age of menopause, and childbirth did not increase the risk of nocturia or urinary frequency. Similar to this study, the study of Bungay et al noted that there was no specific increase in the prevalence of frequency among women in their perimenopausal or postmenopausal years [6].

The prevalence of daytime frequency decreases as parity increases and when it is less than six. In this situation, parity is associated with the prevalence of frequency in this study when parity itself is not just stratified

to be having childbirth or not, as shown in Table 3. Childbirth is not a risk factor for urinary frequency in Taiwanese women aged  $\geq 60$  years when parity itself is stratified to be having childbirth or not, as shown in Table 4.

Frequency itself is a symptomatic urinary disorder of multifactorial origin that has a significant impact on a patient's QoL. However, the perception of the degree of inconvenience caused by frequency differs depending on the knowledge, attitudes, and culture or regional background of the subjects being interviewed. Treatment of frequency is of special importance because it affects the QoL of a very large number of patients even if the answers to the etiology of frequency are still not all known. Of those associated factors related to urinary frequency that are preventable, modifiable, or controllable; H/T, DM, UI, and obesity might have the greatest impact on the prevalence of urinary frequency. Identification of such associations and better treatment and control of the identified factors associated with urinary frequency may lead to the reduction of urinary frequency.

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