

Original Article

# Long-term effect of hysterectomy on urinary incontinence in Taiwan

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## Abstract

**Objective:** To investigate the effect of hysterectomy on urinary incontinence (UI) in Taiwanese women aged 60 or older.

**Materials and Methods:** A nationwide epidemiologic study was conducted and a total of 2410 women were selected by a multistage random sampling method. Face-to-face interviews with 1517 women were completed. The prevalence of UI by hysterectomy, route of hysterectomy, medical reasons for hysterectomy, and years after hysterectomy were assessed by frequency and Pearson's  $\chi^2$  test using a significance level of less than 0.05.

**Results:** The prevalence of hysterectomy in Taiwanese women aged 60 or older was 8.83% (134/1,517). Hysterectomy is a risk factor of UI ( $p = 0.003$ ) with the prevalence of UI estimated to be 42.38% (59/134) and that of nonhysterectomy group to be 27.96% (425/1380). Route of hysterectomy ( $p = 0.825$ ), reason for hysterectomy ( $p = 0.060$ ), and how many years after hysterectomy has been performed ( $p = 0.562$ ) were not associated with deteriorating symptoms of UI.

**Conclusion:** There is a high prevalence of UI among women who have performed hysterectomy, but there is no significant relationship between UI and route of hysterectomy, reason for hysterectomy, including cervical cancer and uterine prolapsed, or year after hysterectomy.

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**Keywords:** Hysterectomy; Lower urinary tract symptoms; Risk factors; Urinary incontinence

## Introduction

Hysterectomy is the most common major gynecological operation performed to treat several benign gynecological conditions [1]. The main indications for hysterectomy are menorrhagia, leiomyoma, endometriosis, benign ovarian

tumors, and genital prolapse [2]. Hysterectomy, however, is one factor that has been suggested to be a risk factor for developing urinary incontinence (UI). There can be little doubt that UI might predispose to hysterectomy. Nevertheless, is it possible for hysterectomy itself to predispose to UI? Altman et al [3] found an increased risk of surgery for stress UI after hysterectomy for benign indications, regardless of surgical technique. In addition, several cross-sectional studies have revealed hysterectomy as an associated risk factor for the development of UI [4–7]. Conversely, there are also several studies that do not support the assumption that abdominal or vaginal hysterectomy

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is associated with an increase in UI [8–12]. The development of UI symptoms might occur several years after the hysterectomy, making it difficult to assess to what extent hysterectomy is responsible for the emergence of UI.

UI is a common problem in women of all ages and creates significant medical, social, and psychological problems in older women. It is so common in older women that it is often viewed mistakenly as a natural process of aging. Therefore, despite the fact that the etiologies are still controversial, it is important to identify the possible risk factors of UI with a view to subsequent prevention. The prevalence and risk factors for UI among Taiwanese women aged 60 or older have been reported [4,13]. The objectives of this study were to investigate the prevalence of hysterectomy and look at the effect of hysterectomy on UI, with regards to the route used and the medical reasons for hysterectomy, as well as the prevalence of UI in the years after hysterectomy in elderly Taiwanese women.

## 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 was conducted by the National Institute of Family Planning (NIFP, Department of Health, The Executive Yuan, Taiwan) since 1989. The third follow-up study of the 1989 survey was completed in 1996, and the 1999 study was conducted in the follow-up survey of both of those cohorts for 1989 and 1996 “Survey of Health and Living Status of the Middle Aged and Elderly in Taiwan” including 1755 women from the first cohort, aged 70 years or older who were selected and interviewed since 1989, and 655 women from the second cohort, aged 60–69 years selected for the third follow-up study of the survey in 1996. The sample sizes of the 60–69 years and 70 years or older age group were not proportional to their corresponding population sizes of 698,394 and 533,208, respectively. Therefore, the precise statistical results were processed by standardization with weights proportional to the population sizes.

This study was conducted in Taiwan between July 1999 and December 2000. There was an estimated 1.25 million women aged 60 years or older 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 used 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, using 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; data coding, cleaning, and analysis were arranged by the NIFP. A committee was organized by the NIFP 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 before 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, 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 depressed to communicate were excluded from the study. The questionnaire was devised to cover five areas: general background; medical history; obstetric and gynecological history, including hysterectomy; UI; and other lower urinary tract symptoms. The questionnaire used in this study was modified from the “URG-database system. Urodynamics and gynecologic urology. HISTORY” [14].

This study was conducted to evaluate the prevalence and determine the factors associated with UI and hysterectomy among Taiwanese women aged 60 years or older. A respondent was considered to have performed hysterectomy when she answered “yes” to the question, “Have you had a hysterectomy performed?” Interviewees who did not answer this question were excluded from the study. When the respondent answered “yes” to the above question, then she had to answer the questions about the route of hysterectomy and how many years it had been performed. Analysis of the individual items was based only on the number of subjects who answered those particular questions.

Table 1  
Prevalence of hysterectomy by age group

Age group	60–64	65–69	70–74	75–79	80–84	85–89	90–96	Total
Respondents	266	263	396	336	160	80	16	1517
Hysterectomy, <i>n</i> (%)	39 (14.66)	29 (11.03)	25 (6.31)	31 (9.23)	9 (5.63)	1 (1.25)	0 (0.00)	134 (8.83)

Table 2  
Prevalence of urinary incontinence by hysterectomy

Hysterectomy	Respondents	Incontinence, <i>n</i> (%) <sup>a</sup>	SE (%)	95% CI	$\chi^2$	<i>df</i>	<i>p</i>
No	1380	425 (27.96)	1.20	25.59–30.32	8.653	1	0.003
Yes	134	59 (42.38)	4.26	34.01–50.75			

<sup>a</sup> The precise statistical results were processed by standardization with weights proportional to the population sizes.  
CI = confidence interval; *df* = degrees of freedom; SE = standard error.

All data were analyzed using SAS (SAS Institute, Cary, NC, USA). Participants 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 variables for each table. A *p* value of 0.05 or lesser was regarded as statistically significant.

## Results

Six hundred twenty-one women who were selected among the 2410 women of the sample in this study had passed away. Two hundred seventy-two women refused the interview, or could not be found, or did not answer the questionnaire. Thus, 1517 women were successfully interviewed and included in this study, producing a response rate of 84.8% (1517/1789). After checking with the original data, there was no significant difference in age and demographic distribution between the respondents and the sample of the study.

From Table 1, this study shows that the prevalence of hysterectomy among Taiwanese women aged 60 or older is 8.83%. The rate of hysterectomy has varied between 5.63% and 14.66% among women aged between 60 years and 84 years and those women between the ages of 60 years and 64 years had the highest rate of hysterectomy.

Hysterectomy was shown to significantly increase the risk of developing UI. The 95% confidence intervals of the two groups in which the surgery had been performed or not were 25.59–30.32% and 34.01–50.75%, and the *p* value equaled 0.003 (Table 2). Nevertheless, Table 3 shows that the route of hysterectomy did not demonstrate a statistically significant relationship with the probability of UI even if abdominal hysterectomy had a higher rate of UI than that of vaginal hysterectomy.

The indications for hysterectomy are listed in Table 4. Uterine tumors, including leiomyomas, are the leading indication for hysterectomy. Pelvic relaxation accounts for 17.65% (15/85) of hysterectomy among Taiwanese postmenopausal women and cervical cancer for another 12.94% (11/85). In

addition, 36.57% (49/134) of the women with hysterectomy could not exactly report the indication for it. Women who had hysterectomy performed for cervical cancer did not report a significantly increased rate of UI than the other groups for different indications.

Most women (65.67%, 88/134) in this study could not remember when hysterectomy had been done. Table 5 shows that the prevalence of UI decreased every 5 years during the first two decades after hysterectomy. Nevertheless, the prevalence of UI among Taiwanese postmenopausal women was not correlated with the number of years since the hysterectomy had been performed.

## Discussion

The prevalence of hysterectomy is relatively high in western countries. Most epidemiological studies of hysterectomy have sampled populations composed almost exclusively of white women, with its prevalence varying from 20% to 39% [15–18]. Ong et al [19] in Ireland reported that the prevalence of hysterectomy by analysis of results of a questionnaire completed by a population-based cohort of 17,735 women aged 50–65 years was 22.2% and the highest incidence of the operation was 29.9% for respondents aged 45–49 years. The prevalence of hysterectomy in Taiwanese women aged 60 or older was 8.83%, which is more than two and a half times lower than that of the previous reports [15–19]. Nevertheless, among Taiwanese women aged between 20 years and 59 years, the self-claimed prevalence rate was 4.44% (157/3537) [20]. This result supports that age might be one of the highly significant risk factors for hysterectomy to be performed—to remedy uterine diseases. The prevalence of hysterectomy increases with age from 4.44% in those aged 20–59 years to 8.83% in those aged 60 years or older. The possible mechanisms to explain the findings for these two age groups for Taiwanese women need further investigation.

The precise mechanism of the development of UI is still unknown, and confounding factors, for example body mass index, diabetes, hypertension, aging, and other abdominal or vaginal surgery may influence the process. It has been

Table 3  
Prevalence of urinary incontinence by route of hysterectomy

Route	Respondents	Incontinence, <i>n</i> (%) <sup>a</sup>	SE (%)	95% CI	$\chi^2$	<i>df</i>	<i>p</i>
Abdomen	113	52 (47.25)	4.69	38.05–56.46	0.049	1	0.825
Vagina	12	5 (41.28)	14.21	13.42–69.13			

<sup>a</sup> The precise statistical results were processed by standardization with weights proportional to the population sizes.  
CI = confidence interval; *df* = degrees of freedom; SE = standard error.

Table 4  
Women's perceptions of medical reasons for hysterectomy ( $n = 85$ )<sup>a</sup>

Medical reason	Respondents	Incontinence, $n$ (%) <sup>b</sup>	SE (%)	95% CI	$\chi^2$	$df$	$p$
Uterine tumors	30	18 (61.12)	8.89	43.68–78.56	14.959	8	0.060
Fibroids	20	6 (32.05)	10.43	11.59–52.50			
Uterine prolapse	15	5 (33.28)	12.16	9.43–57.13			
Cervical cancer	11	6 (31.68)	14.02	4.19–59.18			
Postpartum hemorrhage	3	0 (0.00)	0.00				
Ovarian cyst	2	0 (0.00)	0.00				
Ovarian tumors	2	0 (0.00)	0.00				
Pelvic Infection	1	0 (0.00)	0.00				
Foreign body in uterus	1	0 (0.00)	0.00				

<sup>a</sup> Forty-nine women with hysterectomy could not determine the cause; <sup>b</sup> The precise statistical results were processed by standardization with weights proportional to the population sizes.

CI = confidence interval;  $df$  = degrees of freedom; SE = standard error.

hypothesized that during hysterectomy, damage is caused to the pelvic autonomic plexus, which supplies the lower urinary tract, resulting in UI [21]. Terminal branches of the bilateral plexuses innervate the proximal vagina and bladder and could be damaged, resulting in a defect of the closure mechanism of the proximal urethral sphincter. As in the report by Altman et al [3], this study demonstrates that hysterectomy, irrespective of surgical technique, is associated with an increased risk of developing UI in the postmenopausal stage after surgery. Thus, women should be counseled on the associated risks of developing UI related to hysterectomy in later life.

Nevertheless, there is no difference of prevalence of UI between the routes of the operation performed, either transvaginally or transabdominally. In tradition, hysterectomy done transvaginally is frequently performed in patients who had pelvic relaxation or uterine prolapse and those women particularly at high risk of UI. Although there was no statistical difference for the prevalence of UI between the two groups with different routes of hysterectomy in this study, that of the transvaginal hysterectomy group was a little lower than that of the abdominal group. The result may be because of concomitant pelvic reconstruction and anti-incontinence surgery, such as Kelly plication, which might be performed when doing transvaginal hysterectomy.

This study shows that UI only occurred in hysterectomy for uterine indications, especially for uterine tumors. Nevertheless,

the finding is not statistically significant. Radical hysterectomy for cervical carcinoma has been reported to result in significantly more UI when compared with abdominal hysterectomy for benign uterine diseases [22]. Hazewinkel et al [23] reported that UI was more frequent in cervical cancer survivors than a sample of the random female population. Brooks et al [24] also reported that UI is relatively common after radical hysterectomy as compared with the control group who underwent extrafascial abdominal hysterectomy for benign disease. On the contrary, this study did not show that hysterectomy for cervical cancer increased the risk of UI. The result may be because of too few respondents who underwent hysterectomy for cervical cancer. In addition, this study is limited in that it relied on the women's own description and that it was too long ago for some postmenopausal women to recall the indications for their own hysterectomy. The other limitations for this study include that interviewees could not differentiate one type of uterine tumor from another, and they sometimes could not remember whether they had suffered from UI before the hysterectomy was performed. A previous study has shown that the prevalence of UI among Taiwanese women aged 60 or older was 29.8% [13]. This study shows the prevalence of UI in respondents having hysterectomy was 42.38%, which was much higher than that in the general population. Hence, hysterectomy is significantly associated with the risk of developing UI. From a public health point of view, it is

Table 5  
Prevalence of urinary incontinence by years after hysterectomy<sup>a</sup>

Years after hysterectomy	Respondents	Incontinence, $n$ (%) <sup>b</sup>	SE (%)	95% CI	$\chi^2$	$df$	$p$
1–5	8	6 (85.49)	12.45	61.08–100.00	6.763	8	0.562
6–10	5	2 (43.95)	22.19	0.44–87.46			
11–15	10	3 (37.90)	15.34	7.83–67.98			
16–20	8	2 (12.09)	11.52	0.00–34.68			
21–25	6	3 (50.00)	20.41	9.99–90.00			
26–30	1	0 (0.00)					
31–35	5	4 (81.86)	17.23	48.08–100.00			
36–40	2	0 (0.00)					
41–45	1	0 (0.00)					

<sup>a</sup> Eighty-eight women with hysterectomy could not determine how many years after hysterectomy had been performed; <sup>b</sup> The precise statistical results were processed by standardization with weights proportional to the population sizes.

CI = confidence interval;  $df$  = degrees of freedom; SE = standard error.

extremely important to prevent UI. The results of this study might help to enable physicians to counsel accurately about UI before hysterectomy.

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