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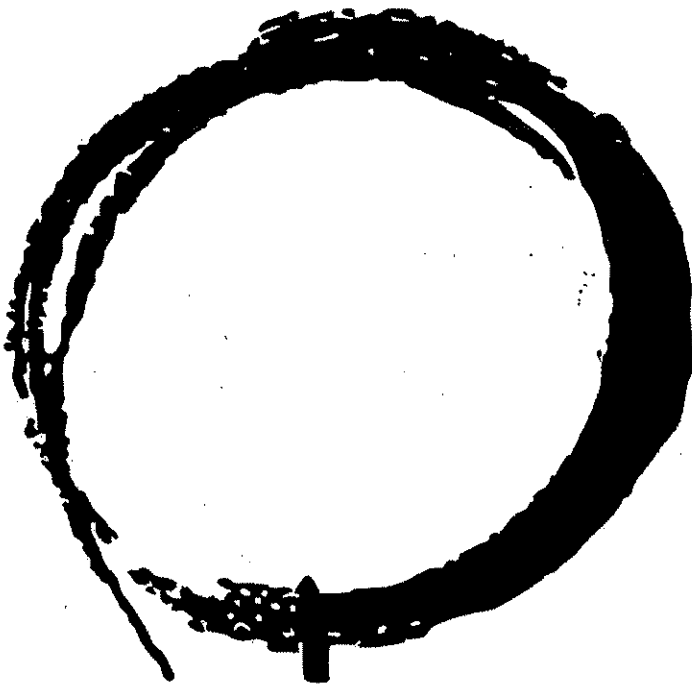
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RESEARCH STUDY

Relationship of Urinary Incontinence to Hysterectomy and Episiotomy

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ABSTRACT

BACKGROUND: Urinary incontinence (UI) is a problem that affects women of all ages. Research has identified many risk factors for the development of UI but is inconclusive regarding the relationship between episiotomy and hysterectomy and the development of UI symptoms. Physical therapists are emerging as primary care providers which increases the importance of attention to and knowledge of risk factors facilitate timely screening and care for women at risk or who have UI signs and symptoms. **PURPOSE:** The purpose of this study was to examine the relationship between episiotomy and hysterectomy and incidence of urinary incontinence. **SUBJECTS:** The subjects included the female patient population of a local women's health care clinic, and female faculty and staff of a small university community. **METHODS:** Information was gathered using a survey from 2 cluster samples. Information included age, parity, history of episiotomy and/or hysterectomy, type and symptoms of incontinence, treatment received, the woman's perception of treatment success, and medications prescribed. **ANALYSES:** Analyses was done separately for the 2 cluster samples. Means and standard deviations were calculated for weight and parity status. Frequencies of response to all other questions were calculated. Comparisons between those who had surgical procedures and those who did not were done using a Chi square. Data was considered significant if at $p < 0.05$. **RESULTS:** The data from the 2 cluster samples were analyzed and are presented separately. Two hundred thirty three surveys were completed by one group and 73 from the other group. Combining the surveys, 18% ($n=55$) reported the presence of incontinence, however, 77% ($n=236$) reported one or more symptoms of incontinence. For all the respondents, there was a significant difference between the incidence of incontinence for the women who had the surgical procedures of episiotomy ($p < .003$) and hysterectomy ($p < .001$), and those who did not have surgeries. **CONCLUSION:** Among the women in our study there was a significant association between the incidence of UI and history of either episiotomy or hysterectomy. An important finding, not related to the original intent of

the study, was that a high percentage of women have symptoms of UI, while not reporting that they have UI. Whether this is from lack of information regarding what UI is, or from a desire not to be classified as having UI, the resultant difference in frequency was significant and should be considered by clinicians in the way they ask specific questions.

Key Words: urinary incontinence, episiotomy, hysterectomy

BACKGROUND

Urinary Incontinence

Urinary incontinence (UI), the loss of voluntary control over the bladder affects more than 13 million Americans.¹ Although it affects individuals of all ages, prevalence is greatest among elderly women. It is estimated that 35% of women ages 65 years or older and 10% of women under 65 experience UI; however, this could be a gross underestimation of the problem since only 50% of those affected seek professional services for the treatment of incontinence.^{2,3}

Urinary incontinence is a broad term encompassing stress, urge, mixed (stress and urge combined), overflow, and functional incontinence.^{4,6} Stress incontinence, a sudden loss of urine due to increased intra-abdominal pressure, is experienced by 50% of women who report urinary incontinence. This unwanted leakage of urine is the most prevalent form of female incontinence and can happen when someone coughs, sneezes, laughs, or exercises.^{1,7} Urge incontinence, also called hyperactive or irritable bladder, is the need to urinate often or the inability to reach a bathroom before leakage occurs.^{1,7} With a hyperactive bladder there is a disruption of the normal sequence of events leading up to urination, yielding the individual incapable of voluntarily controlling the urge to urinate, even temporarily. Research suggests that urge incontinence has greater adverse affects on the quality of life than stress incontinence.⁸

No matter which form of incontinence one experiences, it is rarely life-threatening, however if left untreated it can lead to complications such as skin breakdown, urinary tract infections, and falls and fractures within the elderly population.⁹ Depending on the severity of the condition, UI

can even cause profound psychosocial distress and disability as many individuals experience emotional and psychological complications such as a sense of personal failure and/or shame which prevents them from seeking medical advice and eventual successful treatment.^{8,10-14} In 1995, management of UI was estimated to cost \$16.3 billion annually in persons 15 years and older for routine care, evaluations, and treatment.¹ More recent estimates suggest that the costs have increased to \$26 million annually in the United States alone.¹⁵

Risk Factors

Research has identified several risk factors for the development of stress UI, the major ones being advancing age, race, pregnancy, vaginal births, higher body mass index, and multiple urinary tract infections. In addition, several studies have identified surgical procedures, specifically hysterectomy and episiotomy, as possible risk factors for the development of UI. While there is some research to support the association of hysterectomy and episiotomy and UI, evidence is inconclusive about whether these two surgical procedures contribute to the incidence of stress UI.¹⁵⁻¹⁸

Episiotomy & UI

An episiotomy is the most commonly performed surgery in the world and was introduced in obstetrical practice without strong evidence of its effectiveness. Some of the purported benefits of this procedure include: (1) reducing the risk of a third degree tear to the perineum; (2) reducing trauma to the pelvic floor muscle during labor and delivery, thus preserving it and reducing the risk of fecal and urinary incontinence; (3) a clean straight-line incision heals easier than a tear. The benefits of episiotomy named were examined by Sleep et al¹¹ who used a sample of 1,000 women who were randomly placed in either a group with restricted use of episiotomy or nonrestricted use of episiotomy. The investigators found a much lower rate of severe maternal trauma within the restricted group than had been previously found in other published studies. Therefore, the justification for using episiotomy at a rate as high as 50% in normal deliveries for the prevention of severe maternal trauma was unfounded. Another finding in this study was that a significant proportion of women (19%) with a mean age of 26.6 experienced involuntary loss of urine for 3 months after giving birth, regardless of group placement. In conclusion, this study found that episiotomy did not seem to prevent UI. However, the researchers did not rule out the possibility that the use of episiotomy may prevent stress UI in the long term.

Rockner²⁰ did a survey study of 185 participants examining the effects of episiotomy (n=140) and spontaneous tears (n=42) on UI. There was no difference between the groups in frequency and severity of UI symptoms lending no support to the idea that episiotomy prevents long-term damage to the pelvic floor. A more recent study by Sartore et al²¹ questioned and evaluated 254 women who received mediolateral episiotomy and compared them to 265 women with intact perineum that sustained first and second degree spontaneous tears. Unique to this study was the inclusion of a physical exam that included a digital test, vaginal perineometry, and an uroflowmetric stop test score. No significant difference was found in incidence of UI between the 2 groups. Similarly a study by Samuelsson et al,²² which also included a digital exam and questionnaire of 487 women, found no significant correlations with episiotomy and UI. It is important to note that none of these studies had a cohort group.

Several questionnaire studies that examined the risk factors for UI concur with previous findings.²³⁻²⁷ Foldspang et al²³ surveyed a random, age-stratified (by decade) sample of 4345 Danish women between the ages of 20-59 years to examine the association of UI with pregnancy, vaginal childbirth, and obstetric techniques. In a bivariate analysis, episiotomy and perineal suturing correlated with UI immediately after childbirth. However, in a multivariate analysis, only perineal suturing remained a significant correlate immediately after childbirth. A follow-up study by Hvidman et al,²⁴ surveyed Danish women in the same location as Foldspang et al²³ 3 years later. The purpose of their study was to determine the impact of vaginal delivery on postpartum (PP) UI occurrence and duration. A random, age-stratified sampling of 3900 women was narrowed down to 376 women with single pregnancy selected for analysis. Again, in a bivariate association, episiotomy was not associated with PP UI. Postpartum UI lasting 4 to 12 weeks was positively associated with UI during pregnancy and perineal suturing. Likewise Burgio et al²⁵ and Persson et al²⁶ found no association with UI and episiotomy. Again, no cohorts were used for comparison in these studies.

Alling Møller et al²⁷ had one of the few studies in this review to use a cohort group. They surveyed 502 women with lower UI symptoms and 742 women with no symptoms that served as a control. They found that stress UI was associated with hysterectomy but not with episiotomy. Likewise, Yip et al²⁸ examined the effect of one interval vaginal delivery on the prevalence of stress UI. Two hundred and seventy six nulliparous women without UI were recruited and

served as their own control. Data was collected pre-pregnancy, after they had vaginal delivery and were followed up for UI 4 years later. From the 148 women that were followed up, logistic regression revealed that none of the obstetric variables (mode of delivery, genital trauma, birth weight, epidural, episiotomy, etc.) or the presence of one interval vaginal delivery was significantly associated with stress UI.

In contrast, several studies demonstrate a relationship between UI and episiotomy.^{10,29-32} Skoner et al¹⁰ interviewed 140 women who were divided into those with symptoms of UI (94) and controls (46). They demonstrated a 3-fold increase in risk for those with reported episiotomies for stress UI; however, hysterectomy was not found to be associated with stress UI. A cross-sectional (n=7795 women attending antenatal care) and cohort study (n=1781 pregnant women with one previous delivery) by Håjberg et al²⁹ evaluated the prevalence of UI at 16 weeks gestation and sought to identify maternal and obstetric risk factors. Episiotomy in combination with birthweight >4000 g increased the risk of UI. Spellacy³⁰ concurs with previous findings in that of the 50 women interviewed, episiotomy appeared to be a contributing risk factor with vaginal birth being a major factor in the development of UI early post-partum. However, the sample size of the last study was much smaller than the other studies. In a similar study, Vilttrup et al³¹ used a population comprised of 305 primiparas between the ages of 17-41 with a median age of 26 who were interviewed about stress incontinence before and during pregnancy, as well as 3 months and 5 years after delivery. Episiotomy increased the risk of stress UI 5 years after first delivery as compared to those who did not have an episiotomy.

More recent studies suggest an increase incidence of UI with episiotomy and operational vaginal delivery. Fenner et al³² sent questionnaires to 2941 women months after delivery to estimate the incidence of UI and bowel incontinence in relation to anal sphincter lacerations. Episiotomy was associated with anal sphincter lacerations and more than half of the women had new onset of UI after delivery. Along a similar line, Parazzini et al¹⁶ assessed risk factors for different types of UI in case controlled study of 1062 women aged 40 or more with UI or overactive bladder compared to 1143 controls without symptoms. Operative vaginal delivery, history of caesarean section, and number of vaginal births increased the risk of stress UI. This concurs with the study by Foldspang et al²³ who found that perineal suturing maybe associated with UI immediately following vaginal childbirth.

While there are several studies that have not found an association between episiotomy and UI,¹⁹⁻²⁶ it is important to note that most of these studies did not use a control for comparison. There is conflicting research on the effects of episiotomy on UI in the early postpartum period (immediately after up to 1 year) with a few studies not identifying episiotomy as a risk factor^{24,25,32} compared with 2 other studies^{20,31} that have included it as a risk factor. Similarly, there are conflicting findings regarding episiotomy as a risk factor later postpartum (> 1 year). Furthermore, there are studies that have identified perineal suturing and operational vaginal deliveries as risk factors in contrast to episiotomy.^{21,20,21}

Hysterectomy & UI

Hysterectomy is a gynecological surgical procedure that has been linked in the literature to UI. Several studies^{5,8,10,27,33-37} report a positive relationship between hysterectomy and UI. Earlier studies by Milsom et al⁵ and Thom et al⁸ found an increased occurrence of UI with hysterectomy and profiled women most likely to experience UI. Women who were white, heavier, had a history of hysterectomy prior to age 45, and had a minimum of one live birth were most likely to experience incontinence. Brown et al⁵ completed a systematic review of studies that examined the relationship of UI to hysterectomy. They found 12 studies that met their criteria; 6 of which found associations of hysterectomy with specific types of UI. They concluded that there were increased odds for UI in women with hysterectomy. When they stratified the findings for age, they found that the summary odds ratio for UI was increased by 60% for women who were 60 years or older, but odds were not increased for women younger than 60.

Several studies report an association between hysterectomy and specific types of UI.^{5,8,10,16,27,36,37} A recent study by van der Vaart et al¹⁶ looked at the relationship of hysterectomy to urge and stress UI. A random population sample, consisting of 1626 women, was surveyed and it was found that hysterectomy was associated with increased risk of urge UI (OR of 1.9) and bothersome urge (2.6), but not with stress UI. Furthermore, when adjusted for age, the odds for UI increased 60% for the development of UI in women >60 years of age with a history of hysterectomy. This study concurs with Skoner and colleagues¹⁰ that also found no association between, stress UI and hysterectomy. However, a previously mentioned study by Alling Møller et al²⁷ did find an increased risk of stress UI with hysterectomy with an odds ratio of 2.4 in women 40 to 60 years old. Along these lines, several studies found hysterectomy increased the risk of all types of UI.^{5,16,36,37} Peyrat

et al¹⁶ surveyed 1700 young and middle-aged women (>40 years) and of these, 467 reported UI. This group consisted of 210 with stress UI, 28 urge UI, and 229 mixed UI. It was found that the prevalence of all types of UI increased significantly with hysterectomy with an odds ratio of 1.52, 1.11, and 2.08 respectively. In addition, Miller et al,¹⁷ Minassian et al,³ and Parazzini et al¹⁶ also found hysterectomy to increase the risk of all types of UI in women over 40 years of age.

Several studies question hysterectomy as a risk factor for UI.³⁸⁻⁴² A large prospective cohort study by Kjerulf et al³⁸ administered a Urinary Symptoms Scale for Women to 1299 women before hysterectomy was performed for benign conditions and 6, 12, 18, and 24 months after surgery. They found that the majority of women, with moderate to severe symptoms of UI prior to surgery, experienced improved symptoms during the first 2 years after undergoing hysterectomy. Thakar et al,³⁹ in a randomized, double blind trial compared total and subtotal hysterectomy in 279 women pre- and posthysterectomy for bladder, bowel, and sexual function at 12 months. They found that the reduction in stress incontinence was similar in both groups and neither surgical procedure adversely affected pelvic organ function at 12 months. Altman et al⁴⁰ interviewed 120 patients undergoing hysterectomy to evaluate its effects on lower urinary tract symptoms. Participants were interviewed preoperatively, with a follow up interview at 6 and 12 months. There was no significant change in stress UI symptoms at the 6 and 12 month follow-up. Weber et al⁴¹ used a sample consisting of 43 women who completed questionnaires, both preoperational and again approximately 1 year after surgery for abdominal hysterectomy for benign gynecological conditions. To provide justification for multiple comparisons, they considered only ($p \leq 0.002$) to be statistically significant and concluded that hysterectomy has no significant effects on urinary symptoms. It should be noted that the sample size was very small in their study. An interesting study by Demirci et al⁴² assessed the bladder neck (BN) position and mobility with ultrasonography of 39 patients 1 year after hysterectomy and compared them to 30 control cases in relationship to stress UI symptoms. They found that the backwards mobility (movement of BN in a backwards direction) decreased significantly after hysterectomy; however, there was no significant difference in stress UI symptoms between the study and control group after one year suggesting that hysterectomy did not weaken urethral support, a contributor to UI. It should be pointed out that all of these studies looked at a time frames early (within 2 years) posthysterectomy.

The studies that demonstrate associations between hysterectomy and UI have identified this relationship several years posthysterectomy,^{5,8,10,16,27,36,37} while studies that did not find this relationship looked at timeframes 2 years or less posthysterectomy.³⁸⁻⁴² In addition, while hysterectomy has been associated with all types of UI, stress UI appears to be the most predominant type in most studies.

Other Risk Factors

Other significant variables related to the incidence of UI include but are not limited to, age, race, pregnancy, weight, vaginal delivery, number of births, and history of UTI. In several of the studies mentioned previously, a significant relationship was found with the number of births and prevalence of UI.^{5,15,17,19,27} Skoner et al,⁴ found one or more vaginal deliveries elevated the risk of stress UI. Likewise, Samuelsson et al¹⁷ found that the odds ratio of having incontinence increased from 1-2.7 with increased parity. Foldspang et al¹⁹ found a significant relationship between increased prevalence of UI not only with increased number of childbirths but with age at the second vaginal birth with the strongest risk indicator for stress UI at age 40 or greater. Similarly, Persson et al¹⁵ also found a positive association with UI surgery and age at first delivery. In contrast, Buschshbaum et al¹³ looked at the prevalence of UI and associated risk factors in a group ($n = 149$) of nulliparous nuns. Statistically significant risk factors for UI included body mass index, multiple UTI, and depression. They concluded that the prevalence of UI in nulliparous postmenopausal nuns was similar to rates of parous postmenopausal women suggesting that there maybe other risk factors that are more significant in their contribution toward the development of UI than parity.

Purpose and Significance

The primary purpose of this study was to examine the relationships between hysterectomy, episiotomy, and urinary incontinence. A secondary purpose was to obtain information regarding the symptoms, and treatment if applicable, that the individuals experienced. Urinary incontinence in any form whether it is stress, urge, or mixed, has significant effects on the quality of life of an individual. However, knowledge of the risk factors for UI can be used to improve screening, facilitate prevention and early intervention, and promote better quality in the lives patients who are affected by this problem.

METHOD

Sample

Information was collected from women in 2 selected groups using a questionnaire. Due to the

small size of the local community, 2 sample groups were chosen for better representation of the area. Questionnaires were distributed to all female faculty and staff from the employee list of a local university. In addition, a sample of convenience was used, with surveys being distributed to all females over the age of 17 entering a local women's health care clinic. Questionnaires to the women at the university were distributed via campus mail, with instructions to return it to the researchers via the same method. Surveys at the clinic were distributed by the receptionist to any eligible female during a 3-month period. These individuals were instructed to put completed surveys in a sealed box placed within the waiting area. A cover letter was included with all surveys explaining the purpose of the study, as well as the voluntary nature of participation. The university Institutional Review Board and the women's health care clinic approved this study prior to implementation.

Questionnaire

The questionnaire was specifically designed to elicit information regarding urinary incontinence and the surgical procedures of episiotomy and hysterectomy. It was validated for content by a panel of physical therapists that included a specialist in women's health. The questionnaire was printed on a single page, as it was believed that a shorter questionnaire would improve the ease of completion and potential return rate.

The questionnaire was divided into sections addressing age and parity, gynecological surgical history, incontinence symptoms, and incontinence treatment, when applicable. Questions were primarily forced choice, close-ended, with a space for a checkmark next to the desired answer. Age was identified in decades, beginning with ages 20 to 30 and ending with 90+. The questions on parity were restricted to whether or not the individual had given birth (yes/no) and if so, the number of births. Gynecological surgical history addressed whether or not they had an episiotomy and/or hysterectomy (yes/no). Questions which addressed incontinence included: occurrence and type of incontinence, and frequency and stimuli of incontinence. Type of incontinence was addressed with 2 questions: "Do you leak urine when: coughing, sneezing, laughing, or exercising? (subjects checked off as many symptoms as applied) and "Do you leak urine when you feel the need to urinate?" This was followed by the question, "Do you experience urinary incontinence?" As with other questions, the responses were limited to checking a box for yes or no. As individuals could respond yes to more than one question, the responses were coded as yes/no for individual symptoms, or if they had multiple symptoms, a code was

applied which identified the combination of symptoms that they reported.

If the individual indicated that had received treatment for incontinence, a follow-up question addressed the type of treatment. For this question, the individuals were instructed to check as many treatments as applied. Treatment received for incontinence included the following choices: electrical stimulation, biofeedback, vaginal cones, Kegel exercises, medication, and a blank space for other. A follow-up question asked for the type of medication used for bladder control, if applicable.

The data were analyzed using the SPSS program (version 11.0). Because of demographic differences in the 2 samples, the 2 sets of surveys are presented separately, although together they might be considered representative of the geographic area. Frequencies of response to all questions were calculated. When an individual did not answer the question, the input was identified as missing, thus resulting in a slight variation in analyses of the responses due to numbers. Associations between each surgical procedure and symptoms, and between surgical versus nonsurgical groupings were done using a Chi square. In order to analyze surgical vs. nonsurgical, groupings, the data were recoded. Associations were considered significant if at $p < 0.05$. Odds ratios, with confidence intervals, for presence of UI symptoms by episiotomy or hysterectomy were calculated for the total sample.

RESULTS

Campus Survey Respondents

Of the 408 questionnaires distributed to the university sample, 233 were returned yielding a 57% return. Over 70% of the women were between the ages of 31 – 60 years old, with 36% of the respondents being over the age of 50. More complete characteristics for each sample are presented in Table 1. Seventy five percent ($n=173$) reported that they had given birth. Of these, 17.8% ($n = 28$) of the respondents had one birth, with 82.2% ($n=129$) having more than one birth (16 individuals who reported that they had given birth did not complete the question requesting number of births). The incidence of episiotomy was 50% ($n = 147$) from the appropriate respondents, while 25% ($n = 59$) of all respondents reported having had a hysterectomy. A follow-up analysis showed that 15% ($n = 35$) of all the campus respondents had both an episiotomy and a hysterectomy.

Seventy-six percent ($n = 178$) of the women reported having one or more incontinence symptoms. Frequency of individual symptoms caused by coughing was 3% ($n = 7$), sneezing-9% ($n = 21$), laughing-3% ($n = 7$), and exercising-3% ($n = 7$). An additional 32.6% ($n = 76$) reported they had symptoms, but could not recall which activity caused the leakage. Those reporting 2 symptom producers were 13.4% ($n = 31$), while 4.3% ($n = 10$) reported that 3 of the previous

Table 1. Distribution (percent and frequency for individual sample) Characteristics for Both Samples

	Campus Survey (n = 233) Percent (n)	Clinic Survey (n = 75) Percent (n)
Age Categories *		
20-30 yrs	14.6 (34)	15.1 (11)
31-40 yrs	17.2 (40)	26.0 (19)
41-50 yrs	30.0 (70)	21.9 (16)
51-60 yrs	24.9 (58)	17.8 (13)
61-70 yrs	10.3 (24)	8.2 (6)
71-80 yrs	2.1 (5)	8.2 (6)
81-90 yrs (2 Missing)	0	2.7 (2)
Parity*		
Nulliparous	25.8 (60)	12.3 (9)
1 Birth	12.0 (1)	17.8 (13)
2 Births	33.0 (77)	35.6 (26)
3 Births	16.7 (39)	9.6 (7)
4 Births	3.9 (9)	13.7 (10)
> 4 Births	1.7 (4)	1.4 (1)
	(16 Missing)	(7 Missing)
Episiotomy		
Not applicable	25.8 (60)	12.3 (9)
Yes	50.2 (117)	53.4 (39)
No	21.5 (50)	31.5 (23)
"Don't know"	2.6 (6)	2.7 (2)
Hysterectomy		
Yes	25.3 (59)	28.8 (21)
No	73.0 (170)	71.2 (52)

*Chi-square significant at $P < .05$.

activities caused incontinence, and 8.2% (n = 19) noted that all of the activities elicited incontinence.

However, only 13.7% (n = 32) of the survey respondents reported that they had stress or urge incontinence (5 reporting that they did not know), a difference of approximately 63%. A Phi test was used to assess the apparent discrepancy between responses to the question of incontinence ("Do you have stress or urge incontinence?") versus the questions regarding elicitors of incontinence (eg, "Do you leak urine when coughing, sneezing, laughing, or exercising?"). There was a statistically significant difference ($\Phi = .226, P = .003$) between the responses.

This study also addressed treatment, including duration and type of treatment, the patient's perception of treatment success, and medications taken for the incontinence. Of the 158 respondents who experienced symptoms, 5.2% (n = 12) had received treatment. The most frequent mode of intervention was cited as Kegel exercises. There was no association between the presence of urinary incontinence symptoms with age by decade or parity status. Of the 59 women reporting no births, 46 (78%) reported having UI symptoms. Twenty eight women had one birth, with 18 (64.3%) of these reporting UI symptoms. Similarly, 129 had more than one birth, with 104 (80.6%) reporting UI symptoms. The association between incontinence (as noted by symptoms) and history of hysterectomy was significant ($\chi^2 = 16.516, P < .001$). The odds ratio for the presence of symptoms related to hysterectomy was 2.158 (CI = .949, 4.909). The distributions for both groups can be seen in Table 2. The association between episiotomy and symptoms of UI was also significant ($\chi^2 = 3.956, P < .047$) for the campus sample, as shown in Table 3. The

odds ratio for the presence of symptoms related to episiotomy was 2.105 (CI = 1.003, 4.421).

Clinic Survey Respondents

Over a 3-month period 73 surveys were returned. There was a slight difference in age distribution as compared to the campus survey group, 75.7% (n = 58) being between the ages of 31-60. Though 37.9% (n = 26) were over the age of 50. Also different from the campus group, 85% (n = 62) reported that they had given birth. Of these, 22.8% (n=13) of the respondents had one birth, with 77.2% (n = 44) having more than one birth (5 individuals who reported that they had given birth did not complete the question requesting number of births) (See Table 1). The incidence of episiotomy was 62.9% (n = 39) from the appropriate respondents, while 28.8% (n = 21) of all respondents reported having had a hysterectomy. A follow-up analysis showed that 25.8% (n = 16) of all the clinic respondents had both an episiotomy and a hysterectomy.

Eighty percent (n = 58) of the women reported having one or more incontinence symptoms. Those reporting 2 symptom producers were 15.1% (n = 11), while 8.2% (n = 6) reported that 3 of the previous activities caused incontinence, and 17.8% (n = 13) noted that all of the activities elicited incontinence. As with the campus survey, there was a difference of approximately 55.2% between those that said they had incontinence and those that reported symptoms, which was a statistically significant ($\Phi = .378, P = .005$).

Of the 58 respondents who experienced symptoms, 24.1% (n = 14) had received treatment. Biofeedback, Kegel exercises, and medications were the most frequently reported interventions. There was no association between the presence of urinary incontinence symptoms with age by decade or parity. Of the 11 women

reporting no births, 6 (54.5%) reported having UI symptoms, while 52 (82.9%) of those who had given birth had symptoms of incontinence. The association between incontinence (as noted by symptoms) and history of hysterectomy was not significant for this group (Table 2). However, the association between episiotomy and symptoms of UI was significant ($\chi^2 = 4.211, P < .04$) for the clinic respondents (Table 3). The odds ratio for the presence of symptoms for those that had an episiotomy versus those who had not was 3.627 (CI = 1.017, 12.938).

All Surveys

The odds ratio (OR) for development of symptoms for those who had an episiotomy versus those who had not was 2.381 (CI = 1.264, 4.485). The odds ratio for presence of symptoms among women who had a hysterectomy versus those who had not was 2.066 (CI = 1.02, 4.183). The association between symptom presence and those who had both a hysterectomy and an episiotomy versus those who had no type of gynecological surgical intervention, but were parous, was also significant ($\chi^2 = 6.32, P \leq .012$). These data are presented in Table 4. Finally, the association between the presence of symptoms for all respondents was analyzed. This association was significant, with a Chi square value of 8.288 ($P = .04$).

DISCUSSION

The primary purpose of this study was to examine the association between urinary incontinence and a history of gynecological surgical procedures, specifically episiotomy and hysterectomy. As noted in the results, due to a discrepancy in responses, we used the presence of symptoms as evidence of UI. Overall, there was an association between stress incontinence and episiotomy and hysterectomy. We believe the lack of association for hysterectomy in the clinic survey respondents may be due to a low number and to some demographic differences. Our findings are in partial agreement with other study findings. Some literature suggests that there is a relationship between UI and episiotomy early post-partum, but very few studies have found a relationship with increasing time;^{10,29,32} the opposite is true for hysterectomy. The literature does not support a relationship between UI and hysterectomy early post-op but a relationship becomes evident as the time span increases from the initial surgery.^{5,2,10,27,31,37} The date of the surgical procedures and onset of symptoms was not a monitored variable in our study. Therefore, it is difficult to compare these findings to the trends found in the literature regarding the timeframe between the date of the surgical procedure and onset of symptoms.

Table 2. Cross-tabulation of Presence of Incontinence Symptoms (percent and frequency for each sample) by Hysterectomy by Survey Groups.

Presence of Symptoms	Hysterectomy					
	Campus (n = 229)*		Clinic (n = 73)		Combined (n = 302)*	
	Yes	No	Yes	No	Yes	No
Yes	22.5%(51)	55.5%(127)	24.7%(18)	54.8%(40)	22.8%(69)	55.3%(167)
No	3.5%(8)	18.8%(43)	4.1%(3)	16.4%(12)	3.6%(11)	18.2%(55)

*Chi-square significant at $P < .05$.

Table 3. Cross-tabulation of Presence of Incontinence Symptoms (percent and frequency for each sample) by Episiotomy by Survey Groups.

Presence of Symptoms	Episiotomy					
	Campus (n = 167)*		Clinic (n = 62)		Combined (n = 229)*	
	Yes	No	Yes	No	Yes	No
Yes	56.3%(94)	19.8%(33)	54.8%(34)	24.2%(15)	55.9%(128)	21.0%(48)
No	13.8%(23)	10.2%(17)	8.1%(5)	12.9%(8)	12.2%(28)	10.9%(25)

*Chi-square significant at $P < .05$.

Table 4. Cross-tabulation of Presence of Symptoms (percent and frequency for each sample) by Surgical Interventions and Parity.

	Campus (n = 227)		Clinic (n = 68)		Combined samples (n = 295) ^a	
	Symptoms		Symptoms		Symptoms	
	Yes	No	Yes	No	Yes	No
Nulliparous, No surgery	20.3%(46)	6.2%(14)	8.8%(6)	0%	17.6%(52)	4.7%(14)
Parous, No Episiotomy	14.5%(33)	7.5%(17)	22.1%(15)	11.8%(8)	16.3%(48)	8.5%(25)
Parous, Episiotomy	28.2%(64)	8.4%(19)	30.9%(21)	2.9%(2)	28.8%(85)	7.1%(21)
Episiotomy and Hysterectomy	13.2%(30)	1.8%(4)	19.1%(13)	4.4%(3)	14.6%(43)	2.4%(7)

^a Chi-square significant at $P < .05$.

UI and Gynecological Surgery

Our data indicated that the combined sample had increased odds of having UI symptoms with either episiotomy or hysterectomy. Overall, women who had an episiotomy were approximately 2.3 times likely to develop symptoms and women who had a hysterectomy were 2 times more likely to develop symptoms. This suggests that surgical intervention may be a key factor in the development of incontinence. This is in agreement with some studies, but in contrast to others. Several studies differentiated between stress and urge UI and its association with these 2 types of surgical procedures with contradicting results. Peyrat et al²⁶ and Alling et al²⁷ found an association between stress UI and hysterectomy. In contrast to our findings, van der Vaart et al¹⁸ did not find a relationship between stress UI and hysterectomy but did with urge UI. Similarly, Skoner et al¹⁰ found no association between stress UI and hysterectomy but they did find increased risk of stress UI with having an episiotomy. Several other studies that looked specific types of UI found no relationship between stress UI and episiotomy.^{11,22,26,27} Finally, we also examined the associations with the combined sample for those that had one versus both types of gynecological surgeries. As can be seen in Table 4, the distribution of presence of symptoms was different for each of the groups. When evaluating the presence of symptoms, it appears (Table 4) that those who had an episiotomy had the greatest frequency of symptoms (30%). Within each category those who had both episiotomy and hysterectomy had the greatest frequency of symptoms. To our knowledge, the association between combinations of gynecological surgery to UI has not been addressed. However, when the sample groups were analyzed separately, there was no association between one versus both types of gynecological surgeries. We believe the reason that there was no longer an association was because of the smaller sample size.

Age as a Risk Factor

We did not find age to be a significant variable with our participants. The majority of the studies already previously cited found increasing age to be one of several other contributing factors to the development of UI with the greatest prevalence occurring in the elderly (≥ 60).^{1-5, 15,22,24,26,30,31,36} It would be plausible to presume from the literature reviewed that UI is indeed a natural process of aging and not necessarily a myth or misconception of women as reported in the study by NAFC.⁵ However, most of these studies had confounding factors of parity and vaginal births that have been found to contribute to the development of UI. The sample for our study was relatively young, with majority (62%) of the women surveyed being less than 50 years of age, which could account for this discrepancy. Along these lines, Buchsbaum et al⁴⁵ examined the prevalence of UI in 149 nulliparous nuns and found that advancing age was not an independent risk factor for having UI, whereas other factors such as body mass index, hormone replacement therapy, and multiple LTI were contributing risk factors. While the sample size was small, this study suggests further examination of age as an independent risk factor for UI.

Parity & Births and UI

Our sample did not reveal a significant relationship between UI and parity or number of births. This is surprising since many studies have demonstrated a significant relationship between these two variables.^{5,10,15,16,21,23,27,31} While the survey for this study asked for the number of births, it did not ask for the method of delivery. Therefore, there may have been women in our survey population that may have had cesarean births, which has been found by at least 2 studies to have no relationship to stress UI.^{26,36} Moreover, Foldspang et al²⁴ found a significant relationship between increased prevalence of UI not only with increased number of childbirths but with age at the second vaginal birth with the strongest risk

indicator for stress UI at age 40 or greater. Persson et al⁴⁶ also found a positive associate with UI surgery and age at first delivery. With a relatively young population base it is possible that the average age at the time of birth for this study might have been less than 40 years, decreasing the risk indicator for stress UI. However, when comparing women reporting no births with women having one birth and more than one birth, the percent of reported UI symptoms was very similar (see Figure 3) suggesting that in this study, parity was not a significant contributing factor to the development of UI. This corresponds with Buschbaum et al⁴⁵ survey of predominately postmenopausal nulliparous nuns who found that the prevalence of UI is similar to rates reported in parous, postmenopausal women. Therefore, while vaginal births and number of births may have a significant relationship with the prevalence of UI, they are other contributing risk factors that may be of equal or greater significance.

Interventions

There are many treatment options for UI including pelvic floor muscle exercises (Kegel exercises), biofeedback electrical stimulation, vaginal cones, bladder training, medications, and surgery. Of the 239 survey respondents in our study who experienced symptoms, only 15% (n=36) reported having received treatment. The most frequent mode of intervention cited was Kegel exercises. It is not unusual to have such a small percentage reporting treatment. Our results are in agreement with earlier^{20-44,45} studies that have found a similar trend. Thomas et al⁴⁵ identified that only 1 in 10 women seek professional services for the treatment of incontinence and Rockner⁴⁰ found that out of the 185 women surveyed for symptoms of stress UI, only 4 had sought medical advice. Furthermore, a more recent data suggests that this trend has not changed.³

Hazards of Self-Reporting UI

The information taken from both the surveys from the female faculty and staff at the university and the women's health care clinic did not, at first, demonstrate a significant correlation between the incidence of UI with either episiotomy or hysterectomy. However, as noted in the results, a significant discrepancy was discovered between the subjects' response to the questions about symptoms they had experienced and whether they had stress or urge incontinence. More than half of the survey respondents did not seem to understand the definition of UI. We believe this indicates a clear need for educating the general population about the symptoms of UI. Another hypothesis for this discrepancy of

data could be due to the sensitivity of the topic of UI; perhaps women did not report this type of information even in an anonymous format. Because women are reluctant to talk about these symptoms, it is possible that women may believe that it is normal to leak urine with the various activities surveyed, especially if it has been occurring for a long time. In addition, women may believe that this is a normal process that occurs with aging or after childbirth.

These hypotheses were confirmed by a recent (2002) phone survey of over 1,000 women performed by the National Association for Continence (NAFC),³ which showed that a lack of knowledge and communication keeps women from seeking out treatment for stress UI. This study found that relatively few women (8%) associated symptoms of UI with the medical condition of stress UI and that 8 out of 10 women mistakenly believed that the symptoms associated with stress UI were a normal part of aging. Of the women surveyed, 69% of them were unable to link the symptoms of UI to the medical condition of stress UI. In addition, one of the key findings of this study was the following myths and misconceptions regarding UI: (1) Too much sex and drinking too much water puts you at risk for developing these symptoms. (2) 50% of the women believed that stress UI affects women over 50 years of age. Furthermore, this study identified that women continue to refrain from communicating to others about their symptoms. The combination of the lack of knowledge about UI and embarrassment keeps women from talking about it even with their friends and family. Of the women identified as having stress UI symptoms, only half had consulted their physician, and women between the ages of 35-44 were least likely to consult a physician. The reasons for this had to do with lack of knowledge; 34% felt it was part of the aging process, and 31% believed leakage was something they had to live with. This corresponds with the findings of Roberts et al⁴ who surveyed 762 women and 778 men. The prevalence of incontinence was 49% in women and 24% in men. Additionally, only 13% of the women had sought care compared to 29% of men. These findings suggest that any medical practitioner involved with patient care should take a more proactive approach and initiate conversations about urinary health.

This study was limited by not having direct contact with the subjects, which would have allowed for clarifying and follow up questions that would have provided us with more information. In addition, a sample of convenience from the clinic was used which limits the generalizability of the findings from this group. In order to keep the survey succinct, the number of ques-

tions was limited. Therefore, pertinent information that has been shown in the literature to have associations with UI such as, body weight, date and type of delivery, date of hysterectomy, and history of UFI, was not obtained. Further study should be done to investigate the relationship between time of the episiotomy and hysterectomy and onset of symptoms. In addition, age and parity, as independent risk factors should be further explored.

CONCLUSION

The purpose of this study was to examine relationships between hysterectomy, episiotomy, and UI. We found a significant association between UI signs and symptoms with both episiotomy and hysterectomy. In addition, parity, episiotomy, and hysterectomy increased the odds of having UI signs and symptoms in our sample. Therefore, we recommend parity and both episiotomy and hysterectomy be considered as risk factors for the development of stress UI. When episiotomy and/or hysterectomy present in a woman's medical history, it is appropriate for physical therapists to initiate conversation regarding her urinary health. This type of routine questioning in all types of physical therapy practice settings can lead to opportunities for education, prevention, and appropriate intervention for UI.

An unexpected finding in our research was a significant difference between responses to the question of incontinence "Do you have stress or urge incontinence?" versus the questions regarding elicitors of incontinence (eg, "Do you leak urine when coughing, sneezing, laughing, or exercising?") suggesting a lack of knowledge regarding urinary incontinence. This lack of information or misinformation can preclude women from seeking appropriate intervention. Our data has clearly demonstrated the need for education for the general populous in the area of urinary incontinence. This lack of understanding creates a need and opportunity for physical therapists to be proactive in the initiation of the subject of urinary incontinence with women individually and in public forums in order to provide education on physiological aspects of urinary incontinence, diagnostic criteria, prevention and treatment.

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