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Original Research

Comparison of Urinary Incontinence Subgroups according to Possible Risk Factors

Hatem Kazımoğlu[1], Yunus Emre Topdağı[2], Mehmet Solakhan[3], Ali İrfan Güzel[4]

[1]Department of Urology, SANKO University School of Medicine, Gaziantep, Turkey

[2]Department of Obstetrics and Gynecology, SANKO University School of Medicine, Gaziantep, Turkey

[3]Department of Urology, Bahceşehir University School of Medicine, İstanbul, Turkey

[4]Medifema Hospital, İzmir, Turkey

ABSTRACT

Objective: Urinary incontinence (UI) is involuntary urine flow that causes social and hygienic problems. The association between risks factors and UI in women was assessed. We compared the risk factors based on UI subtypes.

Methods: The study included 470 women with different UI types (320 urge UI [UUI], 80 stress UI [SUI], and 70 mixed UI [MUI]). Age, educational level, urban/rural residence, parity, delivery type, diabetes mellitus (DM), and hypertension status, any neurological abnormality, menopausal status, surgical history, and body mass index (BMI) were obtained.

Results: Of all women, 320, 80, and 70 had UUI, SUI, and MUI, respectively. The groups did not differ significantly in terms of age, hypertension status, neurological abnormality rate, smoking status, or surgical history (all $p>0.05$). Parity, episiotomy, DM status, delivery type, menopause status, hysterectomy history, and BMI differed significantly among the groups (all $p<0.05$).

Conclusion: Our study found that parity, episiotomy, DM status, delivery type, menopause status, hysterectomy history, and BMI may be independent risk factors for different UI types.

Keywords: Stress, urge, urinary incontinence

INTRODUCTION

The lower urinary system consists of the bladder and urethra. However, urine filling and discharging occurs in harmony with the pelvic floor and neurological system that affect the working mechanism of the vesicourethral unit formed by these two anatomical structures. Urinary incontinence is involuntary urine flow that causes social and hygienic problems.

The International Continence Society describes urinary incontinence (UI) as any involuntary urine leakage; UI is subdivided into stress, urge, and mixed UI (MUI). Stress UI (SUI) is defined as intra-abdominal involuntary urine flow that accompanies increased intraabdominal pressure due to urethral hypermobility, bladder neck and insufficient support, and/or proximal urethra arising from failure in the intrinsic sphincter (1, 2). SUI is involuntary urination that occurs while exercising, laughing, sneezing, or coughing. Involuntary loss of urine associated with an urgent need to urinate constitutes UI; MUI is a combination of SUI and urge UI (UUI) (3, 4). Although its incidence increases with age, it affects approximately 20% of all women. Current epidemiological data showed that 17% of women older than 20 years and 38% of women older than 60 years were affected (5, 6).

Previous studies showed that smoking, old age, female sex, familial predisposition, number of births, menopause, poor general health, diabetes mellitus, asthma, high body mass index (BMI)/obesity, chronic constipation, previous urogynecological surgery, cognitive decline, decreased physical function, and other medical and social conditions (pulmonary diseases, neurological diseases, and spinal cord injuries) were UI risk factors (7-10). Here, we evaluated the risk factors in our patients with different UI types. We compared the risk factors based on UI subtypes.

METHODS

This was a prospective case–control study conducted in the department of urology of a tertiary research and education hospital from January 2014 to January 2015. All patients provided informed written consent, and the Sanko University Ethics Committee (November 21, 2018/number: 2018/11-08) approved the protocol. We recorded patient Age, parity, urban/rural residence, educational status, delivery type, diabetes mellitus and hyper-

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ORCID iDs of the authors: H.K. 0000–0001–8224–5068; Y.E.T. 0000–0003–0656–0765; M.S. 0000–0001–9123–9196; A.İ.G. 0000–0002–9518–3772.

Corresponding Author: Yunus Emre Topdağı **E–mail:** emr–topdagi@hotmail.com

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Table 1. Comparison of the clinical parameters between the different types of urinary incontinence

Variables	Urge UI group (n=320)	Mix UI group (n=70)	Stress UI group (n=80)	p
Age (years)	49.48±19.45	52.82±7.05	44.88±9.23	0.127
BMI (kg/m^2)	27.62±6.57	23.07±0.86	22.28±1.22	0.006*
Parity	2.95±2.3	3.54±1.1	2.5±0.88	0.020*
Episiotomy	40 (0.13)	0 (0)	0 (0)	0.017*
Diabetes mellitus	57 (0.18)	35 (0.50)	27 (0.34)	0.001*
Hypertension	102 (0.32)	30 (0.43)	15 (0.19)	0.128
Delivery type				
Cesarean	112 (0.35)	0 (0)	22 (0.28)	0.001*
Vaginal	167 (0.48)	70 (0.93)	57 (0.63)	
No birth	40 (0.13)	0 (0)	0 (0)	
Neurological abnormalities	47 (0.15)	12 (0.18)	5 (0.06)	0.362
Smoking	20 (0.06)	2 (0.04)	0 (0)	0.317
Menopause	137 (0.43)	30 (0.43)	12 (0.16)	0.015*
Previous surgery	135 (0.42)	42 (0.61)	30 (0.38)	0.143
Previous cesarean	75 (0.23)	5 (0.07)	22 (0.28)	0.106
Hysterectomy	20 (0.06)	35 (0.50)	5 (0.06)	0.001*

*: p<0.05: Two-sided p values were considered statistically significant, BMI: body mass index.

tension status, any neurological abnormality, smoking status, and history of surgery, episiotomy, or cesarean section were obtained. The hospital discharge records described maternal conditions based on ICD-10 diagnoses. Incontinence type was evaluated based on the International Continence Society. Exclusion criteria were presence or history of inferior genital tract cancer, previous treatment with pelvic radiotherapy, pregnancy, and previous urogynecological surgery (e.g., sling, anterior/posterior colporrhaphy, Burch operation).

Statistical Analysis

The Shapiro–Wilk test was used to confirm the normality of distribution of continuous variables. The Kruskal–Wallis and Dunn's multiple comparisons tests were used to compare non-normally distributed data among the three groups. The chi-squared test was used to compare pairs of categorical variables, and the Bonferroni correction was used to adjust for multiple comparisons when the chi-squared test result was significant. The Firth logistic regression model of the R ver. 3.5.1 brglm package to reduce bias caused by the low prevalence of certain categories when a binomial-response general linear model is used (11). All univariate statistical analyses were performed using SPSS for Windows ver (IBM SPSS Corp.; Armonk, NY, USA). 24.0; p<0.05 was accepted as statistically significant.

Main Points:

- Although UI is a treatable condition, many women experience psychological, social, and physical problems due to this disorder.
- Parity, episiotomy, DM status, delivery type, menopause status, hysterectomy history, and BMI may be independent risk factors for different UI types.

RESULTS

The study included 470 women with UI, of which 320 (68.1%), 80 (17%), and 70 (14.9%) had UUI, SUI, and MUI, respectively. Table 1 shows the comparison of demographic and clinical characteristics. No significant among-group difference was found for age, hypertension, smoking status, neurological abnormality rate, or surgical history (all p>0.05). Parity, episiotomy, DM status, delivery type, menopause, hysterectomy status, and BMI differed significantly among the groups (all p<0.05). On subgroup analysis using the Dunn's test, BMI in the UUI group was significantly higher than that in the SUI group (p=0.001); significant differences were observed between the SUI and MUI (p=0.011) and between UUI and MUI (p=0.001) groups. Bonferroni correction showed that the incidence rates of episiotomy and DM were significantly higher in the UUI group (p=0.017 and 0.001, respectively). Vaginal delivery was more common in the MUI group (p=0.001), menopause in the UUI group (p=0.015), and previous hysterectomy in the MUI group (p=0.001). Table 2 summarizes the outcomes of logistic regression. Vaginal delivery (OR=82.66) and menopause (OR=32.43) were risk factors for SUI compared with UUI; episiotomy (OR=20.82) and DM (OR=4.32) were risk factors for UUI compared with MUI; and hysterectomy

Tablo 2. Odds ratios of the clinical parameters between the subgroups

Variable groups	OR (95% CI)	p
Urge UI group vs Mix UI		
BMI	0.870 (0.801–0.945)	0.001*
Episiotomy	20.824 (0.992–436.917)	0.003*
Diabetes mellitus	4.326 (1.334–14.028)	0.015*
Delivery type		
No vaginal	0.03 (0.001–0.681)	0.027*
Menopause	0.12 (0.034–0.421)	0.001*
Hysterectomy	0.153 (0.042–0.551)	0.004*
Stress UI group vs Urge UI group		
BMI	0.84 (0.77–0.92)	0.001*
Episiotomy	0.017 (0.001–0.472)	0.017*
Diabetes mellitus	0.179 (0.05–0.64)	0.008*
Delivery type		
No vaginal	82.664 (3.529–1936.155	0.006*
No vaginal no cesarean	47.391 (1.493–1504.326)	0.029*
Menopause	32.434 (7.378–142.584)	0.001*
Stress UI group vs Mix UI group		
BMI	0.48 (0.275–0.846)	0.011*
Hysterectomy	17.112 (3.893–75.228)	0.002*

*: p<0.05: Two–sided p values were considered statistically significant, BMI: body mass index; UI: urinary incontinence

(OR=17.11) and menopause (OR=0.48) were risk factors for SUI compared with MUI. No other significant differences were found among the groups.

DISCUSSION

UI is an important medical and social public health problem due to its incontinence, family, and healthcare costs. Although one-third of women have UI, most women do not consult a physician for this symptom. It is especially important to direct patients with risk factors.

The risk factors were evaluated for UI by UI subtypes. On regression analysis, vaginal delivery (OR=82.66) and menopause (OR=32.43) were risk factors for SUI compared with UUI; episiotomy (OR=20.82) and DM (OR=4.32) were risk factors for UUI compared with MUI; and hysterectomy (OR=17.11) and menopause (OR=0.48) were risk factors for SUI compared with MUI. Previous studies have found that obesity was a risk factor for UI (12, 13). In a cross-sectional study of the Women's Health Australia project, obese women with BMI of 30–40 kg/m^2 were at a two-fold higher risk of UI than women with BMI<20 kg/m^2 (14). Obesity was also found as a risk factor in all subgroups. Basak et al. (10) found that women attending a outpatient urology department tended to have MUI and more than risk or associated factors, including obesity and DM (10).

Childbearing may cause UI in women. The delivery mode is considered a major risk factor for UI; most UI complaints are associated with pregnancy, childbirth, or postpartum issues. However, the impact of birth mode on incontinence and the possible protective role of cesarean section remain debatable. Singh et al. (15) found that UI was more common in women with a history of vaginal delivery compared with nulliparous women and those who underwent cesarean section. However, Parazzini et al. (16) found no increased risk of UUI after vaginal delivery. In another study, the prevalence of both SUI and UUI was lower among nulliparous women and higher among women with 5–6 deliveries (17). This may be associated with impairment in pelvic muscle nerves during birth, development of atrophy in muscles, and development of prolapse over time (18). We found that vaginal delivery was a risk factor for SUI. By contrast, some studies showed that delivery with a birth weight of >4 kg affected UI (19).

Any association between episiotomy and UI remains unclear. In two Turkish studies, no significant correlations were evident between vaginal episiotomy, age at first childbirth, and UI (20, 21). However, Chang et al. (22) found that UI was significantly more common in women who had episiotomy compared with those who did not. Episiotomy was a risk factor in the UI group compared with the MUI group. According to the literature, episiotomy can effectively prevent anterior perineal laceration, but not perineal damage, as well as urinary and anal incontinence and pelvic floor relaxation (23).

DM is also associated with UI. Kılıc et al. (24) considered that DM triggered UI by causing glycosuria, detrusor muscle overactivity, recurrent urinary infections, and diabetic cystopathy. Although some studies found correleations between DM status and UI, other studies did not (25, 26). We found that DM was a risk factor in the UI group compared with the MUI group.

Hysterectomy violates the integrity of the pelvic floor musculature and connective tissue, and denervates the bladder, all of which are associated with UI (27). Two long-term follow-up studies showed significant associations between hysterectomy and UI (28, 29). Similarly, we also found a strong association between hysterectomy and SUI compared with MUI. Previous studies found that menopause affected the UI rate. De Boer et al. reported that menopausal women reported significantly more UI and required more pelvic organ prolapse (POP)/incontinence surgeries than did other women Another study found that menopause predisposed women to POP (30).

CONCLUSION

Although UI is a treatable condition, many women experience psychological, social, and physical problems due to this disorder. Many studies have been conducted on UI risk factors. In our study, we investigated the risk factors among UI subtypes. Such analyses could improve treatment outcomes.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Sanko University School of Medicine (November 21, 2018/number, 2018/11-08).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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REFERENCES

1. Abrams P, Andersson KE, Birder L, Brubaker L, Cardozo L, Chapple C, et al. Fourth International Consultation on Incontinence Recommendations of the International Scientific Committee: Evaluation and treatment of urinary incontinence, pelvic organ prolapse, and fecal incontinence. Neurourol Urodyn 2010; 29: 213-40. [Crossref]
2. Wein AJ. Pathophysiology and categorization of voiding dysfunction. In Walsh PC, Retik AB, Vaughan ED (eds)Campbell's Urology. Philadelphia: WB Saunders 2002; 887-98.
3. Minassian V. Drutz H. Al-Badr A. Urinary incontinence: a worldwide problem. Int J Gynecol Obstet 2003; 82: 327-38. [Crossref]
4. Hayek S. Abrams P. Women's lower urinary tract function and dysfunction: definitions and epidemiology. Minerva Gynecol 2004; 56: 311-25.
5. Goode PS, Burgio KL, Redden DT, Markland A, Richter HE, Sawyer P, et al. Population based study of incidence and predictors of urinary incontinence in black and white older adults. J Urol 2008; 179: 1449-53. [Crossref]
6. Lukacz ES, Santiago-Lastra Y, Albo ME, Brubaker L. Urinary Incontinence in Women: A Review. JAMA 2017; 318: 1592-604. [Crossref]
7. Markland AD, Goode PS, Burgio KL, Redden DT, Richter HE, Sawyer P, et al. Correlates of urinary, fecal, and dual incontinence in older African-American and white men and women. J Am Geriatr Soc 2008; 56: 285-90. [Crossref]
8. Smith AL, Wang PC, Anger JT, Mangione CM, Trejo L, Rodríguez LV, et al. Correlates of urinary incontinence in community-dwelling older Latinos. J Am Geriatr Soc 2010; 58: 1170-6. [Crossref]
9. Tennstedt SL, Link CL, Steers WD, McKinlay JB. Prevalence of and risk factors for urine leakage in a racially and ethnically diverse population of adults: The Boston Area Community Health (BACH) Survey. Am J Epidemiol 2008; 167: 390-9. [Crossref]
10. Basak T, Uzun S, Arslan F. Incontinence features, risk factors, and quality of life in Turkish women presenting at the hospital for urinary incontinence. J Wound Ostomy Continence Nurs 2012; 39: 84-9. [Crossref]
11. Firth D. Bias reduction of maximum likelihood estimates. Biometrika 1993; 80: 27-38. [Crossref]
12. Tsai Y-C, Liu CH. Urinary incontinence among Taiwanese women: An outpatient study of prevalence, co morbidity, risk factors, and quality of life. Int Urol Nephrol 2009; 41: 795-803. [Crossref]
13. Onur R, Deveci SE, Rahman S, Sevindik F, Acik Y. Prevalence and risk factors of female urinary incontinence in eastern Turkey. Int J Urol 2009; 16: 566-9. [Crossref]
14. Chiarelli P, Brown W, McElduff P. Leaking urine: prevalence and associated factors in Australian women. Neurourol Urodyn 1999; 18: 567-77. [Crossref]
15. Singh U, Agarwal P, Verma ML, Dalela D, Singh N, Shankhwar P. Prevalence and risk factors of urinary incontinence in Indian women: A hospital-based survey. Indian J Urol 2013; 29: 31-6. [Crossref]
16. Parazzini F, Chiaffarino F, Lavezzari M, Giambanco V. Risk factors for stress, urge or mixed urinary incontinence in Italy. BJOG 2003; 110: 927-33. [Crossref]
17. Shakhatreh F. Epidemiology of urinary incontinence in Jordanian women. Saudi Med J 2005; 26: 830-5.
18. Kaşıkçı M, Kılıç D, Avşar G, Şirin M. Prevalence of urinary incontinence in older Turkish women, risk factors, and effect on activities of daily living. Arch Gerontol Geriatr 2015; 61: 217-23. [Crossref]
19. Oliveira E, Zuliani L, Ishicava J, Silva SV, Albuquerque SS, Souza AMB, Barbosa CP. Evaluation of factors related to the occurrence of female urinary incontinence. Rev Assoc Med Bras 2010; 56: 688-90. [Crossref]
20. Bilgili N, Belgin A, Emel E, Sultan A. Incidence of the urinary incontinence and affecting risk factors in women Turkiye Klinikleri. J Med Sci 2008; 28: 487-93.
21. Karaçam Z, Eroğlu K. Effects of episiotomy on bonding and mothers' health. J Adv Nurs 2003; 43: 384-94. [Crossref]
22. Chang SR, Chen KH, Lin HH, Chao YM, Lai YH. Comparison of the effects of episiotomy and no episiotomy on pain, urinary incontinence, and sexual function 3 months postpartum: a prospective follow-up study. Int J Nurs Stud 2011; 48: 409-18. [Crossref]
23. Hartmann K, Viswanathan M, Palmieri R, Gartlehner G, Thorp J, Lohr KN. Outcomes of routine episiotomy: a systematic review. JAMA 2005; 293: 2141-8. [Crossref]
24. Kılıç M. Incidence and risk factors of urinary incontinence in women visiting Family Health Centers. Springerplus 2016; 5: 1331. [Crossref]
25. Song YF, Zhang WJ, Song J, Xu B. Prevalence and risk factors of urinary incontinence in Fuzhou Chinese women. Chin Med J 2005; 118: 887-92.
26. Zhu L, Lang J, Wang H, Han S, Huang J. The prevalence of and potential risk factors for female urinary incontinence in Beijing, China. Menopause 2008; 15: 566-9. [Crossref]
27. Skorupska KA, Miotła P, Kubik-Komar A, Rechberger E, Adamiak-Godlewska A, Rechberger T. Urinary incontinence after hysterectomy-does type of surgery matter? Ginekol Pol 2016; 87: 94-7. [Crossref]
28. Altman D, Granath F, Cnattingius S, Falconer C. Hysterectomy and risk of stress-urinary-incontinence surgery: nationwide cohort study. Lancet 2007; 370: 1494-9. [Crossref]
29. Allahdin S, Harrild K, Warraich QA, Bain C. Comparison of the long - term effects of simple total abdominal hysterectomy with transcervical endometrial resection on urinary incontinence. BJOG 2008; 115: 199-204. [Crossref]
30. De Boer TA, Slieker-Ten Hove MC, Burger CW, Kluivers KB, Vierhout ME. The prevalence and factors associated with previous surgery for pelvic organ prolapse and/or urinary incontinence in a cross-sectional study in The Netherlands. Eur J Obstet Gynecol Reprod Biol. 2011; 158: 343-9. [Crossref]