Risk factors for urinary incontinence in Turkish women

A cross-sectional study

Tuncay M. Filiz, *MD,* ***Cefariye Uludag,*** *PhD,* ***Nursan Cinar,*** *PhD,* ***Suleyman Gorpelioglu,*** *MD,* ***Pinar Topsever,*** *MD.*

ABSTRACT

Objective: To explore the association between conventional risk factors and urinary leakage among a random sample of adult Turkish women.

Methods: Six hundred and fifty patients (mean age 33.2 ± 10.6 years; range 17-65 years) attending 6 Primary Health Care Centers in the Eastern Marmara Region, Turkey were randomly enrolled in this study, between September 2005 and December 2005. After signing their informed consent, all patients filled in a questionnaire consisting of questions inquiring any kind of urinary leakage, related symptomatology and personal medical history.

Results: One hundred and six women (16.4%) with urinary incontinence (UI) were reported. The most frequent type of incontinence was mixed UI (n=65, 61.3%). The prevalence of stress UI among all incontinent women was 20.8% (n=22) and urge UI 17.9% (n=19). The prevalence was associated with age, body mass index and parity. Number of pregnancies was positively correlated with prevalence of incontinence (r=0.30, $p<0.001$). Women who had ≥2 deliveries had a higher risk of UI (odds ratio = 4.04, 95% confidence interval, 2.37 to 6.89, $p<0.001$).

Conclusion: The results of this study supported previous reports revealing that age, body mass index, type of deliveries and number of pregnancies/deliveries are risk factors of UI, and showed that age, body mass index and number of pregnancies should be regarded as independent risk factors.

Saudi Med J 2006; Vol. 27 (11): 1688-1692

Urinary incontinence (UI) is a widespread health problem affecting the physical, psychological, social and economic well-being of individuals and their families.[1-9] Prevalence of female UI in Turkey was reported as 25.8%,[10] 23.9%,[11] and 20.8%.[12] Parous and obese women seem to be at a higher risk for urinary leakage than nulliparous and normal weight women although, the mechanism for this association is not understood.[3,13-15] The aim of the present study was to explore the association between parity and urinary leakage among a random sample of adult Turkish women. We also investigated if there is an association of UI with age and/or body mass index (BMI).

Methods. There are 34 primary health care centers (PHCs) in the city center and 56 PHCs in the peripheral suburbs of Sakarya. A total of

From the Department of Family Medicine (Filiz, Gorpelioglu, Topsever), Faculty of Medicine, Kocaeli University, Kocaeli and from the School of Health Sciences (Uludag, Cinar), Sakarya University, Kocaeli, *Turkey*.

Received 25th April 2006. Accepted for publication in final form 15th July 2006.

Address correspondence and reprint request to: Dr. Tuncay M. Filiz, Posta Kutusu 1029, Yahya Kaptan 41050, Izmit, Kocaeli, *Turkey*. Tel. +90 (262) 3037408. Fax: +90 (262) 3037003. E-mail: dalim_99@hotmail.com/ topsever@gmail.com

122,360 women >20 years were registered. Out of these PHCs, 3 central and 3 peripheral PHCs were randomly selected for the study. In these selected PHCs, there were 32,632 registered women >20 years (15,070 central, 17562 peripheral). According to these numbers, a representative sample size of 589 women was calculated with a 5% significance level and 4% deviation. A predicted "non response" rate of 10% was added. Every women attending to these 3 PHCs aged 20 years or more were informed about this study. Among them the first 650 women who accepted to take part in the study assigned after their verbal informed consent. This study has been conducted between September 2005 and December 2005, in Sakarya. The participants received a comprehensive questionnaire consisting of 2 parts; the first part was investigating health aspects, the second was including specific questions about incontinence symptoms. The participants filled-in the second part, if they affirmatively answered the question about any kind of involuntary loss of urine. To evaluate the risk factors for UI, 2 populations were defined, namely women with or with no UI symptoms. Urge incontinence was defined as any leakage of urine. Circumstance of leakage (coughing, sneezing, laughing, on effort/physical exertion, associated with sexual intercourse, washing hands, with a sudden and strong urge to void and so forth) was categorized. If the woman declared complaint of involuntary loss of urine on effort or exertion, or on sneezing or coughing without urge to go to the toilet, stress incontinence (SUI) was defined. Urge urinary incontinence (UUI) was defined as the complaint of involuntary leakage of urine accompanied by or immediately proceeded by urgency. If both complaints were answered affirmatively, mixed urinary incontinence (MUI) was defined.[16,17] The population was classified into aged ≤30 and >30 years, this threshold being the median age of the study population. Obesity was defined by BMI of ≥25 and the 2 groups were defined, not obese (BMI <25) and obese (BMI ≥25).

Statistical analysis. The potential relationship of each factor with UI was analyzed. Descriptive data were presented as mean (median, standard deviation (SD)) or percentage. The relationship between each potential risk factor and UI was estimated using the Chi-squared test. The probability values of less than 0.05 were considered significant. Odds ratios (OR) were used to describe the effects of risk factors on UI. The relationship between age, BMI and UI was also estimated with correlation analysis. In order to identify the independent determinants/predictors of UI, binary logistic regression with the presence of UI as dependent and potential risk factors as covariates (age, BMI, number of pregnancies and deliveries, and mode of delivery) was performed.

Results. The mean age of the study population was 33.2 (median = 30.0, SD10.6) years. One hundred and six (16.4%) women reported UI symptoms (SUI=22 [20.8%], UUI=19 [2.9%], MUI=65 [61.3%]). The reported prevalence of UI increased from 7.4% in women aged <30 to 25.3% in those aged ≥30 (**Table 1**). The trend analysis showed that prevalence of UI was significantly different between age groups and increased with age (r=0.33, $p<0.001$), and those aged ≥30 years were more at risk of UI (OR=4.26, 95% CI, 2.62 to 6.93, $p<0.001$). Body mass index was positively correlated with UI (r=0.28, $p<0.001$) and the prevalence of UI significantly increased with obesity (from 9.8% to 23.7%, $p<0.001$). Obesity increased the risk for UI by 2.86 (95% CI, 1.83 to 4.45, $p<0.001$). There was no significant difference in UI between the group of cesarean delivery (n=8, 9.9%) and the group with no pregnancies (n=9, 5.5%). Prevalence of UI increased in women with previous vaginal delivery (n=70, 21.9%) and it was a significant risk (OR=4.82, 95% CI, 2.34 to 9.93, $p<0.001$). The number of pregnancies were positively correlated with prevalence of incontinence (r=0.30, $p<0.001$). The relationship between the number of pregnancies and UI is illustrated in **Table 2.** Urinary incontinence prevalence was also associated with

Table 1 - Number of incontinent women (n) and prevalence (%) according to age groups.

Groups	Age groups (years)					Total
	≤30	31-35	36-40	41-44	≥45	
With urinary incontinence	24 (7.4)	10 (12.0)	9 (12.9)	20 (27.4)	43 (43.9)	**106 (16.3)**
With no urinary incontinence	302 (92.6)	73 (88.0)	61 (87.1)	53 (72.6)	55 (56.1)	**544 (83.7)**
Total	**326 (100)**	**83 (100)**	**70 (100)**	**73 (100)**	**98 (100)**	**650 (100.0)**

Table 2 - Prevalence of incontinence by number of pregnancies.

Women	Number of pregnancies					Total
	0	1	2	3	≥4	
With UI symptom	5 (3.8)	6 (6.1)	19 (14.2)	20 (14.7)	56 (37.1)	**106 (16.3)**
Without UI	126 (96.2)	92 (93.9)	115 (85.8)	116 (85.3)	95 (62.9)	**544 (83.7)**
Total	**131 (100)**	**98 (100)**	**134 (100)**	**136 (100)**	**151 (100)**	**650 (100)**

UI - urinary incontinence

Table 3 - Number of women with incontinence (n1) without incontinence (n2) and urinary incontinence prevalence (%) according to age and number of deliveries.

Number of deliveries	Age Group						Total n1/n2 (%)	
	20-34 n1/n2 (%)		35-44 n1/n2 (%)		≥45 n1/n2 (%)			
0	9/150	(5.7)	0/3	(0.0)	0/1	(0.0)	**9/154**	**(5.8)**
1	7/85	(7.6)	1/8	(11.1)	1/0	(100)	**9/93**	**(9.7)**
2	10/80	(11.1)	9/37	(19.6)	4/7	(36.4)	**23/124**	**(18.5)**
3	4/38	(9.5)	5/39	(11.4)	11/31	(26.2)	**20/108**	**(15.6)**
≥4	1/13	(7.1)	8/22	(26.7)	36/30	(54.5)	**45/65**	**(40.9)**
Total	**31/366**	**(8.4)**	**23/109**	**(21.3)**	**52/69**	**(42.9)**	**106/544**	**(16.3)**

Table 4 - Number of incontinent women (n) and prevalence (%) according to mode of deliveries.

Incontinence	Mode of deliveries			Total
	Vaginal only	Cesarean only	Vaginal and cesarean	
Yes	70 (21.9)	8 (9.9)	19 (22.4)	**97 (20.0)**
No	250 (78.1)	73 (90.1)	66 (77.6)	**389 (80.0)**
Total	**320 (100)**	**81 (100)**	**85 (100)**	**486 (100)**

Table 5 - Binary logistic regression analysis with presence of urinary incontinence as dependent and age, BMI, number of pregnancies as covariates.

Parameters	B	Standard error	Wald	Degrees of freedom	Significant	*Exp(B)	95% confidence interval for Exp(B)	
							Lower	Upper
Age	0.04	0.01	9.05	1	0.003	1.04	1.02	1.07
Body mass index (BMI)	0.07	0.03	7.60	1	0.006	1.07	1.02	1.12
Number of pregnancies	.33	0.12	7.03	1	0.008	1.39	1.09	1.77
Constant	-5.81	0.66	77.31	1	0.000	0.003		

*Exp (B) - estimated odds ratio

both, age and parity (**Table 3**). In the age group 20-34 years, the prevalence was approximately 4-fold higher (5.7% for nullipara and 22.6% for primipara). A greater effect was found in the age group 35-44 years, where the second delivery accounted for an increase in prevalence from 4.3-39.1%. Women who had ≥2 deliveries had a higher risk for urinary incontinence (OR= 4.04, 95% CI, 2.37 to 6.89, $p<0.001$).

Table 4 shows the prevalence of incontinence, according to mode of delivery. The prevalence was more than doubled from 9.9% of women who had undergone cesarean section to 21.9% and 22.4% for women who had vaginal delivery of any pregnancy. Out of 514 women who had delivered, 295 (57.4%) had previous episiotomy and 58 (19.7%) of them were reported as UI. Among women without previous episiotomy (n=219, 42.6%) 41 women (18.7%) were incontinent. The difference between proportions was insignificant (OR= 1.06, 95% CI, 0.68 to 1.66, $p=0.82$). Binary logistic regression with the presence of UI as dependent and potential risk factors such as age, BMI, number of pregnancies and deliveries, and type of delivery as covariates, revealed age, BMI and number of pregnancies as the independent predictors of UI. Results of the binary logistic regression analysis with odds ratios (exponential beta) for independent predictors of UI are displayed in **Table 5**.

Discussion. The overall prevalence of UI in the present study was 16.4, increasing to 43.9% in those aged ≥45 years, decreasing to 7.4% in those aged ≤30. The reported prevalence varies. The community based studies report prevalence rates ranging from 4.8 to 58.4%.[6,18] Melville et al,[19] in a study of 6,000 women aged 30-90 years, reported a prevalence of 42%; 28% were from the youngest decade and 55% from the oldest decade. Reported female UI prevalence from Turkish population based studies were 20.8%,[12] 23.9%,[11] and 25.8%.[10] In most of the epidemiologic studies, a questionnaire was used with neither clinical examination nor laboratory methods, as in the present. In this study, UI was defined as any involuntary leakage of urine with no regard to severity or frequency.[16,17] The reported prevalence in studies conducted with the same definition was 13-58.4%.[12,20-25] Constitutional, gynecological and obstetric histories have been identified as risk factors for female UI. In the present study, the prevalence of UI increased with age in concordance with the literature.[11,14,26-29] Obesity, was positively correlated with the risk of UI in the present study. In obese women symptoms of UI were found to be common[3,30-34] and there is an evidence from clinical series that weight loss has a positive impact on UI.[35-38] Gynecological and obstetric histories were regarded as risk factors for UI, although reports are controversial. Some studies consider parity as a risk factor for UI,[3,8,34,39-42] and some other perineal trauma due to vaginal delivery.[43,44] It is still a question of debate if the type of delivery is the true risk factor or pregnancy alone. In the present study, both pregnancy and vaginal delivery were risk factors while cesarean deliveries were not. Parity and type of delivery were confounded risk factors for UI in the logistic regression analysis.

In conclusion, the results of the present study supported previous reports revealing that age, BMI, type of deliveries and number of pregnancies/ deliveries were risk factors of UI, and showed that age, BMI and number of pregnancies should be regarded as independent risk factors. Community based health programs should provide informations about UI risk factors to all women, and preventive strategies should be implanted accordingly, especially in younger adults. Physicians of primary health care should be aware of the prevalence of UI and question about this issue even if it is not the patient's reason for encounter because this problem covers almost one fourth of the middle aged women and is perceived as a biopsychosocial problem.

References

1. Lionis C, Vlachonikolis L, Bathianaki M, Daskalopoulos G, Anifantaki S, Cranidis A. Urinary incontinence, the hidden health problem of Cretan women: report from a primary care survey in Greece. ***Women Health*** 2000; 31: 59-66.
2. Bortolotti A, Bernardini B, Colli E, Di Benedetto P, Giocoli Nacci G, et al. Prevalence and risk factors for urinary incontinence in Italy. ***Eur Urol*** 2000; 37: 30-35.
3. Melville JL, Katon W, Delaney K, Newton K. Urinary incontinence in US women: a population-based study. ***Arch Intern Med*** 2005; 165: 537-542.
4. Hagglund D, Olsson H, Leppert J. Urinary incontinence: an unexpected large problem among young females. Results from a population-based study. ***Fam Pract*** 1999; 16: 506-509.
5. Avellanet M, Fiter M, Cirera E, Coll M. Prevalence of urinary incontinence in Andorra: impact on women's health. ***BMC Womens Health*** 2003; 3: 5.
6. Minassian VA, Drutz HP, Al-Badr A. Urinary incontinence as a worldwide problem. ***Int J Gynaecol Obstet*** 2003; 82: 327-338.
7. Damian J, Martin-Moreno JM, Lobo F, Bonache J, Cervino J, Redondo-Marquez L, et al. Prevalence of urinary incontinence among Spanish older people living at home. ***Eur Urol*** 1998; 34: 333-338.
8. Zhang W, Song Y, He X, Xu B, Huang H, He C et al. Prevalence and risk factors of lower urinary tract symptoms in Fuzhou Chinese women. ***Eur Urol*** 2005; 48: 309-313.
9. Andersson G, Johansson JE, Garpenholt O, Nilsson K. Urinary incontinence-prevalence, impact on daily living and desire for treatment: a population-based study. ***Scand J Urol Nephrol*** 2004; 38: 125-130.
10. Ozerdogan N, Beji NK, Yalcin O. Urinary incontinence: its prevalence, risk factors and effects on the quality of life of women living in a region of Turkey. ***Gynecol Obstet Invest*** 2004; 58: 145-150.

11. Kocak I, Okyay P, Dundar M, Erol H, Beser E. Female urinary incontinence in the west of Turkey: prevalence, risk factors and impact on quality of life. ***Eur Urol*** 2005; 48: 634-641.
12. Maral I, Ozkardes H, Peskircioglu L, Bumin MA. Prevalence of stress urinary incontinence in both sexes at or after age 15 years: a cross-sectional study. ***J Urol*** 2001; 165: 408-412.
13. Rortveit G, Hannestad YS, Daltveit AK, Hunskaar S. Age- and type-dependent effects of parity on urinary incontinence: the Norwegian EPINCONT study. ***Obstet Gynecol*** 2001; 98: 1004-1010.
14. Samuelsson E, Victor A, Svardsudd K. Determinants of urinary incontinence in a population of young and middle-aged women. ***Acta Obstet Gynecol Scand*** 2000; 79: 208-215.
15. Chiarelli P, Brown W, McElduff P. Leaking urine: prevalence and associated factors in Australian women. ***Neurourol Urodyn*** 1999; 18: 567-577.
16. Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U et al. The standardisation of terminology in lower urinary tract function: report from the standardisation sub-committee of the International Continence Society. ***Urology*** 2003; 61: 37-49.
17. Messelink B, Benson T, Berghmans B, Bo K, Corcos J, Fowler C et al. Standardization of terminology of pelvic floor muscle function and dysfunction: report from the pelvic floor clinical assessment group of the International Continence Society. ***Neurourol Urodyn*** 2005; 24: 374-380.
18. Cheater FM, Castleden CM. Epidemiology and classification of urinary incontinence. ***Baillieres Best Pract Res Clin Obstet Gynaecol*** 2000; 14: 183-205.
19. Melville JL, Delaney K, Newton K, Katon W. Incontinence severity and major depression in incontinent women. ***Obstet Gynecol*** 2005; 106: 585-592.
20. Hannestad YS, Rortveit G, Sandvik H, Hunskaar S. A community-based epidemiological survey of female urinary incontinence: the Norwegian EPINCONT study. Epidemiology of Incontinence in the County of Nord-Trondelag. ***J Clin Epidemiol*** 2000; 53: 1150-1157.
21. Lara C, Nacey J. Ethnic differences between Maori, Pacific Island and European New Zealand women in prevalence and attitudes to urinary incontinence. ***N Z Med J*** 1994; 107 (Pt 1): 374-376.
22. Nygaard IE, Lemke JH. Urinary incontinence in rural older women: prevalence, incidence and remission. ***J Am Geriatr Soc*** 1996; 44: 1049-1054.
23. Sze EH, Jones WP, Ferguson JL, Barker CD, Dolezal JM. Prevalence of urinary incontinence symptoms among black, white, and Hispanic women. ***Obstet Gynecol*** 2002; 99: 572-575.
24. Brieger GM, Mongelli M, Hin LY, Chung TK. The epidemiology of urinary dysfunction in Chinese women. ***Int Urogynecol J Pelvic Floor Dysfunct*** 1997; 8: 191-195.
25. Burgio KL, Matthews KA, Engel BT. Prevalence, incidence and correlates of urinary incontinence in healthy, middle-aged women. ***J Urol*** 1991; 146: 1255-1259.
26. Rortveit G, Daltveit AK, Hannestad YS, Hunskaar S. Urinary incontinence after vaginal delivery or cesarean section. ***N Engl J Med*** 2003; 348: 900-907.
27. Araki I, Beppu M, Kajiwara M, Mikami Y, Zakoji H, Fukasawa M et al. Prevalence and impact on generic quality of life of urinary incontinence in Japanese working women: assessment by ICI questionnaire and SF-36 Health Survey. ***Urology*** 2005; 66: 88-93.
28. Peyrat L, Haillot O, Bruyere F, Boutin JM, Bertrand P, Lanson Y. Prevalence and risk factors of urinary incontinence in young and middle-aged women. ***BJU Int*** 2002; 89: 61-66.
29. Rizvi RM, Nazim MH. The frequency of urinary symptoms in women attending gynaecology clinics at the Aga Khan University Hospital Karachi, Pakistan. ***J Pak Med Assoc*** 2005; 55: 489-492.
30. Mommsen S, Foldspang A. Body mass index and adult female urinary incontinence. ***World J Urol*** 1994; 12: 319-322.
31. Foldspang A, Mommsen S. [Overweight and urinary incontinence in women]. ***Ugeskr Laeger*** 1995; 157: 5848-5851.
32. Jueng-Anuwat P, Roongruangsilp U, Kochakarn W, Ratana-Olarn K. Risk factors for stress urinary incontinence in middle aged and elderly Thai women. ***J Med Assoc Thai*** 2001; 84: 1121-1125.
33. Han MO, Lee NY, Park HS. Abdominal obesity is associated with stress urinary incontinence in Korean women. ***Int Urogynecol J Pelvic Floor Dysfunct*** 2006; 17: 35-39.
34. Sottner O, Zahumensky J, Krcmar M, Brtnicka H, Kolarik D, Driak D et al. Urinary Incontinence in a Group of Primiparous Women in the Czech Republic. ***Gynecol Obstet Invest*** 2006; 62: 33-37.
35. Sugerman HJ. Effects of increased intra-abdominal pressure in severe obesity. ***Surg Clin North Am*** 2001; 81: 1063-1075vi.
36. Lara MD, Kothari SN, Sugerman HJ. Surgical management of obesity: a review of the evidence relating to the health benefits and risks. ***Treat Endocrinol*** 2005; 4: 55-64.
37. Richter HE, Burgio KL, Clements RH, Goode PS, Redden DT, Varner RE. Urinary and anal incontinence in morbidly obese women considering weight loss surgery. ***Obstet Gynecol*** 2005; 106: 1272-1277.
38. Subak LL, Whitcomb E, Shen H, Saxton J, Vittinghoff E, Brown JS. Weight loss: a novel and effective treatment for urinary incontinence. ***J Urol*** 2005; 174: 190-195.
39. Shakhatreh FM. Epidemiology of urinary incontinence in Jordanian women. ***Saudi Med J*** 2005; 26: 830-835.
40. Holroyd-Leduc JM, Straus SE. Management of urinary incontinence in women: scientific review. ***JAMA*** 2004; 291: 986-995.
41. Tegerstedt G, Maehle-Schmidt M, Nyren O, Hammarstrom M. Prevalence of symptomatic pelvic organ prolapse in a Swedish population. ***Int Urogynecol J Pelvic Floor Dysfunct*** 2005; 16: 497-503.
42. Altman D, Zetterstrom J, Schultz I, Nordenstam J, Hjern F, Lopez A et al. Pelvic organ prolapse and urinary incontinence in women with surgically managed rectal prolapse: a population-based case-control study. ***Dis Colon Rectum*** 2006; 49: 28-35.
43. Demirci F, Ozden S, Alpay Z, Demirci ET, Ayas S. The effects of vaginal delivery and cesarean section on bladder neck mobility and stress urinary incontinence. ***Int Urogynecol J Pelvic Floor Dysfunct*** 2001; 12: 129-133.
44. Meyer S, Schreyer A, De Grandi P, Hohlfeld P. The effects of birth on urinary continence mechanisms and other pelvic-floor characteristics. ***Obstet Gynecol*** 1998; 92 (4 Pt 1): 613-618.