



Urinary incontinence in female university students

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Abstract

Introduction and hypothesis We aimed to determine the prevalence of urinary incontinence (UI) in nulliparous female university students and to provide an overview of risk factors associated with urinary continence.

Methods A total of 1,397 female university students aged 18–28 years were enrolled into this cross-sectional questionnaire study. The self-administered questionnaires, the International Consultation on Incontinence Questionnaire Short Form (ICIQ-SF), Overactive Bladder V8 (OAB-V8), demographics, and general characteristics were recorded. The frequency, type, and severity of urinary incontinence and related factors were evaluated.

Results The mean age of the students was 20.27 ± 1.69 years. The prevalence of UI in female university students was 18.4% ($n = 258$). ICIQ-SF total score was 0.85 ± 2.11 (0–14). OAB-V8 total score was 5.97 ± 5.35 (0–40) and 27.0% of participants had scores of ≥ 8 . Elevated BMI, childhood enuresis, constipation, exercising, positive family history for UI, accommodation in a dormitory, and holding urine at school are risk factors associated with UI in female university students.

Conclusion We demonstrated that UI is a common condition among female university students. The identification of the associated risk factors will help to further raise the knowledge and awareness of the problem, and preventive strategies may be proposed to young women to improve the quality of life and psychological well-being.

Keywords Urinary incontinence · Prevalence · Young women · Risk factor

Introduction

Urinary incontinence (UI) is involuntary urine leakage that leads to social and hygienic problems. It constitutes a common public health issue and negatively affects women of all ages and it causes the quality of life to deteriorate remarkably [1]. There are three common types of UI: stress UI refers to urine leakage provoked by effort, exercise, sneezing or coughing, urge UI refers to a constant sense of urgency to urinate and mixed UI refers to urine leakage resulting from the coexistence of stress and urge UI [2].

Age and obesity are well-established risk factors for UI [3]. The other risk factors are parity, smoking, chronic diseases, constipation, pelvic surgery, high-impact physical activities,

menopause, caffeine use, difficult labor, giving birth to a newborn weighing more than 4 kg, and use of medications such as psychotropic drugs, angiotensin-converting enzyme inhibitors, and diuretics [4].

The prevalence of female UI varies widely in relevant publications. Most of these studies focus on perimenopausal and postmenopausal women. Urinary incontinence particularly affects the elderly and women who have given birth [3]. However, epidemiological studies demonstrated that young nulliparous women may also suffer from UI [5–7].

Urinary incontinence is an often underdiagnosed and undertreated condition in young women and only a few women with UI seek medical help in this age group [8]. The prevalence of complaints linked with UI may vary with age, and the UI prevalence in female university students has not yet been studied extensively. The determination of frequency and related factors for UI is important for the establishment of preventive measures. It is possible to treat or reduce the symptoms of UI by lifestyle modifications and other conservative treatment methods. Thus, we aimed to investigate the prevalence and potential risk factors of UI in female university students with no risk factors.

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Materials and methods

This cross-sectional questionnaire study was performed in the obstetrics and gynecology and family medicine departments of our tertiary care center between January 2018 and June 2018. The study population consisted of female university students regardless of their departments. The questionnaires were distributed to the volunteers who were willing to participate in the study. All data collection was anonymous and the self-administered questionnaires were filled out with the aid of an assistant. The assistant who performed the data collection immediately checked whether the questionnaires were properly filled in. Missing and incomplete answers were highlighted and corrected by the participants on site. The questionnaire included a demographic session (age, height and weight, employment, marital status, and place of accommodation), and the International Consultation on Incontinence Questionnaire Short Form (ICIQ-SF) and Overactive Bladder V8 (OAB-V8) questionnaires to determine the frequency, type, severity, and related factors of the urinary incontinence. Ethics committee approval was received from the local institutional review board (decision No:2017/183).

The ICIQ-SF scale has been developed by the International Continence Society (ICS) for the assessment of UI and its impact on the quality of life. It yields satisfactory degrees of sensitivity, validity, and reliability. The questionnaire possesses a good test–retest reliability, with the lowest kappa value of 0.54 in one of the categorical variables, whereas the other kappa values ranged between 0.61 and 1.0 [9]. This scale has been validated for Turkish language [10]. The Cronbach's alpha reliability of ICIQ-SF was 0.95 [11]. The ICIQ-SF scale has four items other than age and gender. The ICIQ-SF monitors the frequency of UI and the amount of leaked urine in the first and second items respectively. The third item investigates the degree of deterioration of quality of daily life due to the leakage of urine. The total score of ICIQ-SF is calculated by the sum of the scores of these three items. The ICIQ-SF total score represents the severity and bother score, which ranges from 0 to 21. The total score can be graded for the severity of UI (0: no leak; 1–5: slight; 6–12: moderate; 13–18: severe; 21: very serious urine leakage) [9]. The fourth item of the ICIQ-SF questions the possible causes of UI and helps to identify the type of UI. Depending on the answers to the fourth question, urinary incontinence is categorized as having stress incontinence (leakage during coughing, sneezing or physical activity), urge incontinence (leakage before getting to the toilet), or mixed incontinence (a combination of stress and urge incontinence).

The OAB-V8 is a short questionnaire that focuses on the symptoms of urge UI. It contains eight questions for symptom scores. The total score is obtained from the sum of the answers given to all questions and it ranges between 0 and 40. Patients with total OAB-V8 score ≥ 8 were considered to have an OAB

[12]. The Cronbach's alpha reliability of OAB was 0.90 [13]. OAB-V8 questionnaire has been validated in the Turkish language [14].

Beverages such as tea, fruit tea, herbal tea, coffee, acidic beverages, fruit juices, and alcoholic drinks are liquids with a diuretic effect, whereas water, milk, buttermilk, soup, ice cream do not have a diuretic effect [15].

Two or more micturitions per night was defined as nocturia [16]. The body mass index (BMI) was classified as: <18.5 underweight; 18.5–24.9 normal weight; >25 overweight [17].

Female students aged between 18 and 28 years were included in our study. Students with any urological or gynecological disease, a history of surgery for urogynecological problems, neurological and respiratory diseases, urinary tract infection symptoms, and current or previous pregnancies were excluded from the study.

The Statistical Package for Social Sciences program (SPSS, Chicago, IL, USA) version 21 was used for the analysis of our data. In descriptive statistics, mean, standard deviation, and minimum and maximum values in numerical variables were given, whereas in categorical variables, on the other hand, number and percentage values were given. To test the presence of a significant difference between groups, a *t* test was performed. On the other hand, the differences between three or more groups were examined by one-way analysis of variance (ANOVA). In the case of the presence of a difference, the group(s) that showed the difference were examined using the paired comparisons test. The Pearson or Spearman coefficient of correlation was used to determine whether there was a significant relationship between numerical variables. When evaluating the effect of significant variables on the response variable together, multi-linear regression analysis was used. A *p* value less than 0.05 was considered statistically significant.

Results

A total of 1,397 female university students participated in this study. The mean age of the students was 20.27 ± 1.69 years (minimum to maximum: 18–28). The mean height of the participants was 1.64 ± 0.06 m (64.56 ± 2.36 in; minimum to maximum: 1.45–1.87 m; 57.09–73.62 in), whereas their mean body weight 58.38 ± 9.59 kg (128.70 ± 21.14 lb; minimum to maximum: 40–125 kg; 88.18–275.58 lb). Table 1 demonstrates an overview of the sociodemographic characteristics of this population.

The mean total fluid intake with daily diuretic effect was 759.12 ± 499.52 ml, whereas it was $1,343 \pm 639.39$ ml for the mean fluid amount without diuretic effect. Four hundred and eighty-six participants (34.8%) had consumed less than 1,500 ml fluid daily, whereas 770 cases (55.1%) had a daily

Table 1 Sociodemographic characteristics of female university students

Characteristics	(N = 1,397)	Percentage
Age		
≤19	524	37.5
≥20	873	62.5
BMI (kg/m ²)		
<18.5	169	12.1
18.5–24.9	1,087	77.8
>25	141	10.1
Employment status		
No	1,371	98.1
Yes	26	1.9
Place of accommodation		
Dormitory	893	63.9
Off-campus apartment	317	22.7
Parent-owned house	187	13.4
Marital status		
Married	12	0.9
Single	1,385	99.1
Constipation		
No	1,242	88.9
Yes	155	11.1
Chronic diseases		
No	1,303	93.3
Yes	94	6.7
Smoking habit		
No	1,149	82.2
Ex-smoker	59	4.2
Yes	189	13.5
Alcohol consumption		
No	1,216	87.0
Yes	181	13.0
Physical exercise status		
Never	366	26.2
Every day	73	5.2
Twice a week	229	16.4
Irregular	729	52.2
Childhood enuresis		
No	1,125	80.5
Yes	272	19.5
Holding urine at school		
Never	492	35.2
Once a week	485	34.7
2–3 times a week	202	14.5
Almost everyday	218	15.6
Family history of urinary incontinence		
No	1,123	81.1
Yes	261	18.9
Daily fluid consumption		
<1,500 ml	486	34.8
1,500–3,000 ml	770	55.1
>3,000 ml	141	10.1

BMI body mass index

fluid consumption of between 1,500 and 3,000 ml, and 141 (10.1%) participants reported a daily fluid intake >3,000 ml.

Table 2 demonstrates the ICIQ-SF total scores and grades of participants. ICIQ-SF total score was 0.85 ± 2.11 (minimum to maximum: 0–14). Regarding the diagnostic fourth item, the ICIQ-SF question “Under which conditions does urinary incontinence occur?”, 81.6% of students ($n = 1,139$)

reported that they never experienced UI. Of the remaining participants 18.4% ($n = 258$) stated that they had urinary incontinence in different situations. UI occurred before getting to the toilet (8.6%), on sneezing and coughing (1.2%), during sleeping (2.9%), with physical exertion (1.9%), after the cessation of micturition (3.3%), without any reason (0.4%), and all the time (0.0%). The responses to this question indicate the prevalence and type of UI and are displayed in Table 3.

The association between the severity of UI and risk factors is demonstrated in Table 4. The UI was found to be more frequent in students with a BMI > 25 ($p = 0.011$), a history of constipation ($p = 0.002$), family history of UI ($p < 0.001$), childhood enuresis ($p < 0.001$), who exercise every day ($p < 0.001$), who hold urine at school almost every day ($p = 0.006$) and who live in the dormitories ($p = 0.005$).

The sum of responses to eight questions in the OAB-V8 questionnaire yields the total score and it was 5.97 ± 5.35 (minimum to maximum: 0–40). 73.0% of participants had scores of <8, whereas 27.0% of participants had scores of ≥8. The association between OAB-V8 total score and risk factors is shown in Table 5. Accordingly, urge incontinence was found to be statistically highly significant in students with obesity ($p < 0.001$), constipation ($p < 0.001$), chronic diseases ($p < 0.001$), history of childhood enuresis ($p < 0.001$), and family history of UI ($p < 0.001$).

Discussion

Urinary incontinence is a frequent disorder that affects women of all ages. Although it is not a life-threatening condition, it adversely affects physical and mental health and causes the quality of life of women to deteriorate [8]. The prevalence of urinary incontinence increases with age, from 7% in non-pregnant women aged 20–39 years to 17% in the age group 40–59, 23% in the age group 60–79 and 32% in women over 80 years old [18]. Most of the studies on this subject were performed on women in middle and advanced ages. In the relevant literature, we could find only one previous study, which focused on UI prevalence among female nulliparous women in a large series [6]. We aimed to determine the prevalence of UI in female university students and our results indicated that the prevalence of UI was 18.4% in this population. We demonstrated that UI was a common condition in women in this young age group with no additional risk factors.

Previous publications show a marked variation in the prevalence of UI in young women (ranging between 6.2% and 32%) and this variability may be attributed to the differences in methodology and definitions [6,7,19,20].

In our study, we found that BMI, childhood enuresis, constipation, exercising, a family history of UI and place of accommodation are the associated risk factors for UI in female university students, according to the ICIQ-SF questionnaire.

Table 2 International Consultation on Incontinence Questionnaire Short Form (ICIQ-SF) total score and severity of urinary incontinence ($N = 1,397$)

Characteristic	Statistics
ICIQ-SF total score (0–21), mean standard deviation (minimum to maximum)	0.85 ± 2.11 (0–14)
Severity of UI, n (%)	
No leak (0)	1,114 (79.7)
Slight (1–5)	216 (15.5)
Moderate (6–12)	62 (4.4)
Severe (13–18)	5 (0.4)
Very serious (19–21)	0 (0.0)

Childhood enuresis and a family history of urinary incontinence and constipation were also supposed to be risk factors for UI in other studies [6,21]. Moreover, chronic diseases may constitute risk factors for UI in university students according to the OAB-V8 questionnaire.

Elevated BMI, exercising, and constipation may cause chronic increases in intra-abdominal pressure and causes an increase in intravesical pressure that exceeds the urethral closure pressure. Chronic elevated intra-abdominal pressure weakens the pelvic floor and leads to incontinence [22]. These factors are associated with stress UI. Obesity is closely related to the occurrence of UI. The association between BMI and UI had been studied previously and every five-unit increase in BMI augmented the risk of UI by 20–70% [23]. Hence, achieving a healthy BMI is important for reducing UI and improving women's psychological and social well-being [24].

The other risk factors, such as childhood enuresis, a family history of urinary incontinence, smoking habits and place of accommodation, may indicate psychological stress [25]. These conditions could share similar etiological factors. Childhood enuresis and family history of UI may be linked

Table 3 Diagnostic fourth item of the International Consultation on Incontinence Questionnaire Short Form (ICIQ-SF): causes and prevalence of urinary incontinence ($N = 1,397$)

When does urine leak?	n	Percentage
Never—urine does not leak	1,139	81.6
Leaks before you can get to the toilet	120	8.6
Leaks when you cough or sneeze	17	1.2
Leaks when you are asleep	41	2.9
Leaks when you are physically active/exercising	27	1.9
Leaks when you have finished urinating and are dressed	46	3.3
Leaks for no obvious reason	5	0.4
Leaks all the time	0	0.0

to a lack of learning how to achieve normal urinary bladder control during toilet training. These factors have been commonly reported with urge UI in other studies [26–28]. Recognition of UI at an early age may facilitate treatment, thereby avoiding the occurrence of UI in adulthood.

Many women experience emotional difficulties, such as shame and embarrassment about seeking medical aid for UI and related complaints. The hope for a spontaneous resolution of UI, embarrassment at being examined by a clinician, reluctance to discuss one's complaint, the belief that urine leakage is a normal occurrence and lack of awareness regarding the availability of treatment were their reasons for not seeking UI treatment [8]. Women may experience fear and shame about UI and these feelings may lead to discouragement and ignorance of their complaints, resulting in a lack of resolution of UI. Younger women were more likely to be under stress and to be ashamed of their UI [19]. Previous publications reported that embarrassment was of central concern for women affected by UI and only about 25% of women seek medical help for this complaint [29].

Urinary incontinence was usually diagnosed only when its signs and symptoms persisted and became stronger [30]. It is difficult for women to identify UI as a medical condition. Health professionals should be aware of the fact that only a few women with UI seek medical help. The health professionals should give counseling to women by increasing their awareness about UI-related risk factors, by facilitating the expression of their urinary system complaints comfortably and by informing them about when to seek medical care for their urinary symptoms.

The prevention and timely diagnosis of UI is important, particularly at a young age. Based on the patients' needs, UI can be managed in different preventive strategies, such as continence advisory services addressing lifestyle changes, behavioral therapy, and fluid intake management; physiotherapy for strengthening pelvic floor muscles, bladder retraining programs, and medication [31]. Health professionals have an important function in the identification of the components of an effective management plan, evaluation of risk factors for UI, establishment of interventions to diagnose the treatable underlying causes as per women's needs, and the monitoring of women's treatment outcomes.

Necessary measures should be taken in university students, including creating policies to improve women's health by developing an early diagnosis, management and support programs, health policies, and prevention and management of the condition. Prevention of obesity, constipation, and urinary tract infections, regulation of the amount and content of the liquid consumed can reduce urinary incontinence episodes. Improvement in UI episodes has been noted after weight loss, treatment of constipation, and modification of lifestyle; thus, administration of a prevention program in young women at risk can be an effective and useful approach [32].

Table 4 Severity of urinary incontinence and risk factors

Characteristics		Severity of UI (ICIQ-SF total score)			<i>p</i> value
		No leak, <i>n</i> (%)	Slight, <i>n</i> (%)	Moderate or severe, <i>n</i> (%)	
BMI	<18.5	136 (80.5)	28 (16.6)	5 (3.0)	0.011
	18.5–24.9	880 (81.0)	153 (14.1)	54 (5.0)	
	>25	98 (69.5)	35 (24.8)	8 (5.7)	
Employment status	No	1092 (84.6)	212 (15.5)	67 (4.9)	0.273
	Yes	22 (79.6)	4 (15.4)	0 (0.0)	
Place of accommodation	Dormitory	691 (77.4)	149 (16.7)	53 (5.9)	0.005
	Off-campus apartment			12 (3.8)	
	Parent-owned house	269 (84.9)	36 (11.4)	2 (1.1)	
Marital status	Married	11 (91.7)	0 (0.0)	1 (8.3)	0.123
	Single	1103 (79.6)	216 (15.6)	66 (4.8)	
Constipation	No	1007 (81.1)	179 (14.4)	56 (4.5)	0.002
	Yes			11 (7.1)	
Chronic diseases	No	1045 (80.2)	198 (15.2)	60 (4.6)	0.269
	Yes	69 (73.4)	18 (19.1)	7 (7.4)	
Smoking habit	No	914 (79.5)	177 (15.4)	58 (5.0)	0.901
	Ex-smoker	47 (79.7)	10 (16.9)	7 (3.7)	
	Yes	153 (81.0)	29 (15.3)		
Alcohol consumption	No	970 (79.8)	188 (15.5)	58 (4.8)	0.993
	Yes	144 (79.6)	28 (15.5)	9 (5.0)	
Physical exercise status	Never	272 (74.3)	79 (21.6)	15 (4.1)	<0.001
	Everyday	50 (68.5)	11 (15.1)	12 (16.4)	
	Twice a week	193 (84.3)	32 (14.0)	4 (1.7)	
	Irregular	599 (82.2)	94 (12.9)	36 (4.9)	
Childhood enuresis	No	944 (83.9)	140 (12.4)	41 (3.6)	<0.001
	Yes	170 (62.5)	76 (27.9)	26 (9.6)	
Holding urine at school	Never	392 (79.7)	69 (14.0)	31 (6.3)	0.006
	Once a week	388 (80.0)	84 (17.3)	13 (2.7)	
	2–3 times a week	170 (84.2)	27 (13.4)	5 (2.5)	
	Almost every day	164 (75.2)	36 (16.5)	18 (8.3)	
Family history of UI	No	936 (83.3)	149 (13.3)	38 (3.4)	<0.001
	Yes	166 (63.6)	66 (25.3)	29 (11.1)	
Daily fluid consumption	<1,500 ml	375 (77.2)	83 (17.1)	28 (5.8)	0.312
	1,500–3,000 ml	621 (80.6)	117 (15.2)	7 (5.0)	
	>3,000 ml	118 (83.7)	16 (11.3)		

BMI body-mass index, *UI* urinary incontinence, *ICIQ-SF* International Consultation on Incontinence Questionnaire Short Form

The main strengths of this study are the large sample size and the use of a validated questionnaire to diagnose UI. The potential limitations of this study involve data confined to the experience of a single-center, selection bias, and the lack of sophisticated diagnostic methods for UI. These limitations should be kept in mind when interpreting the results.

Urinary incontinence may lead to discomfort, loss of confidence, and self-esteem, and may have adverse effects, not

only on physical and mental health but also on the quality of life of women. A multi-disciplinary assessment of women's health and a preventive protocol can be developed for women at a young age to improve knowledge and awareness.

To conclude, UI is a hidden health problem in female university students. In our series involving a group of otherwise healthy young women, the UI prevalence was high. The estimation of UI prevalence in female university students and

Table 5 The Overactive Bladder-V8 (OAB-V8) questionnaire total score and risk factors

Characteristics		OAB total score (mean ± standard deviation: 5.97 ± 5.35; minimum maximum: 0–40)		
		< 8, N = 1,020 (73.0%)	≥ 8, N = 377 (27.0%)	p value
BMI	<18.5	147 (87.0)	22 (13.0)	<0.001
	18.5–24.9	792 (72.9)	295 (27.1)	
	>25	81 (57.4)	60 (42.6)	
Employment status	No	997 (88.5)	374 (27.3)	0.073
	Yes	23 (72.7)	3 (11.5)	
Place of accommodation	Dormitory	634 (71.0)	259 (29.0)	0.077
	Off-campus apartment	242 (76.3)	75 (23.7)	
	Parent-owned house	144 (77.0)	43 (23.0)	
Marital status	Married	11 (91.7)	1 (8.3)	0.199
	Single	1009 (72.9)	376 (27.1)	
Constipation	No	932 (75.0)	310 (25.0)	<0.001
	Yes	88 (56.8)	67 (43.2)	
Chronic diseases	No	967 (74.2)	336 (25.8)	<0.001
	Yes	53 (56.4)	41 (43.6)	
Smoking habit	No	853 (74.2)	296 (25.8)	0.056
	Ex-smoker	37 (62.7)	22 (37.3)	
	Yes	130 (68.8)	59 (31.2)	
Alcohol consumption	No	894 (73.5)	322 (26.5)	0.269
	Yes	126 (69.6)	55 (30.4)	
Physical exercise status	Never	246 (67.2)	120 (32.8)	0.012
	Every day	49 (67.1)	24 (32.9)	
	Twice a week	174 (76.0)	55 (24.0)	
	Irregular	551 (75.6)	178 (24.4)	
Childhood enuresis	No	864 (76.8)	261 (23.2)	<0.001
	Yes	156 (57.4)	116 (42.6)	
Holding urine at school	Never	348 (70.7)	144 (29.3)	0.255
	Once a week	359 (74.0)	126 (26.0)	
	2–3 times a week	157 (77.7)	45 (22.3)	
	Almost everyday	156 (71.6)	62 (28.4)	
Family history of UI	No	854 (76.0)	269 (24.0)	<0.001
	Yes	154 (59.0)	107 (41.0)	
Daily fluid consumption	<1,500 ml	355 (73.0)	131 (27.0)	0.833
	1,500–3,000 ml	565 (73.4)	205 (26.6)	
	>3,000 ml	100 (70.9)	41 (29.1)	

BMI body mass index, OAB overactive bladder

recognition of the risk factors may help to increase awareness of this problem. Our data may encourage young women to seek medical care for this complaint. Their quality of life will be improved owing to the effect of early diagnosis and appropriate treatment on their participation in daily activities such as sports, sexual life, and social communication. Further efforts should be made to implement preventive strategies and to provide counseling on the prevention of UI in young women.

Compliance with ethical standards

Conflicts of interest None.

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