European Review for Medical and Pharmacological Sciences 2023; 27: 6769-6779

Prevalence, affecting factors and relationship with toileting behaviors of lower urinary tract symptoms in pregnant women: a cross-sectional study

E. DESTEGÜL[1], S. KOCAÖZ[2], P. KARA[3], A. YAVUZ[4]

[1]Department of Obstetrics and Gynecology, Adana City Training and Research Hospital, Adana, Turkey
[2]Department of Nursing, Department of Obstetrics and Gynecology, Zübeyde Hanım Faculty of Health, Niğde Ömer Halisdemir University, Niğde, Turkey
[3]Department of Nursing, Faculty of Health, İstiklal University, Kahramanmaraş, Turkey
[4]Department of Surgical Sciences, Department of Obstetrics and Gynecology, Medical Faculty, Niğde Ömer Halisdemir University, Niğde, Turkey

Abstract. – OBJECTIVE: This study aimed to determine factors associated with lower urinary tract symptoms and their prevalence in pregnant women, and to examine the relationship between these symptoms and toileting behavior.

PATIENTS AND METHODS: The study included 502 pregnant women who completed the Bristol Female Lower Urinary Tract Symptoms-Short Form and the Toileting Behavior-Women's Elimination Behaviors Scale.

RESULTS: The prevalence of at least one symptom in terms of urinary storage, voiding, urinary incontinence, sexual function, and quality of life dimensions in pregnant women were 99%, 54.8%, 60.4%, 19.7%, and 72.5%, respectively.

CONCLUSIONS: The results showed that the lower urinary tract symptoms of pregnant women were related to premature voiding (developing the habit of voiding when there is less than 260 ml of urine in the bladder), being in the third trimester of pregnancy, the presence of stress urinary incontinence during or after pregnancy and history of urinary tract infection. Furthermore, it was found that pregnant women's total Bristol Female Lower Urinary Tract Symptoms-Short Form score had a weak correlation with their Toileting Behavior-Women's Elimination Behaviors Scale general total score, and scores in the subsections on premature voiding, delayed voiding, and straining for voiding. Given that lower urinary tract symptoms are common among pregnant women, women should be offered antenatal training on lower urinary tract symptoms and preventative measures early on in their pregnancy to ensure they develop healthy toileting habits.

Key Words:
Lower urinary tract symptoms, Pregnant women, Toileting behavior.

Introduction

Pregnancy can negatively affect the normal function of the lower urinary system[1]. Lower urinary tract symptoms (LUTS) consist of three main sub-dimensions: storage, voiding, and post-micturition[2]. These symptoms are common among pregnant women[3]. According to various studies[3,4], the prevalence of at least one symptom in pregnant women varies between 78.6-89.2%. Voiding symptoms, such as nocturia and frequency, are significantly more frequent during pregnancy[3,5,6], and it is well-established[7] that the incidence of LUTS increases with advanced gestational age. Age, urinary infection, pelvic organ prolapses, neurological diseases[7], chronic diseases such as diabetes, hypertension[8], obesity[9], bladder irritant foods[10], constipation[3], and working conditions[11] have all been demonstrated to have a role in LUTS development. The anatomical, physiological and hormonal changes experienced during pregnancy affect the lower urinary tract of women[12]. Also, the factors that may cause LUTS are an increase in women's age, high body mass index (BMI), and multiparity[13].

The most important parameter in distinguishing between healthy and unhealthy toilet behavior is the patient's perception of this situation. In this context, voiding place preference, voiding time, voiding position, and voiding style are the main parameters to define toilet behaviors[14]. Apart from pregnancy, there are many different factors affecting the prevalence of LUTS[8]. In addition to those mentioned above, unhealthy bladder habits have been associated with LUTS in women[15]. Also, unhealthy toileting behavior acquired in childhood[11] may cause an increase in the prevalence of LUTS or worsen existing symptoms in women[11,15].

Corresponding Author: Emre Destegül, MD; e-mail: destegulemre@hotmail.com

Besides lowering the quality of life[4], LUTS can adversely affect physical, social and psychological health, in turn having negative effects on women's family, work, and sexual life. Despite the negative effects of LUTS on their lives, many women fail to seek treatment due to various barriers. Therefore, women's awareness needs to be raised about symptoms like urinary incontinence (UI) that are rarely expressed[9]. Information should be offered about healthy toileting habits, preventive strategies, lifestyle changes, and possible treatments in order for them to maintain normal lower urinary system function[10].

There are numerous studies[3,6,16] on the prevalence and influencing factors of LUTS in pregnant women worldwide. However, none have been found on the relationship between LUTS in pregnant women and toileting behavior in the context of other influential factors. Therefore, the study was conducted to identify the prevalence of LUTS in pregnant women, the influencing factors, and the relationship between the symptoms and toileting behavior.

Patients and Methods

Study Design and Participants

The study population of this cross-sectional study consisted of pregnant women who were admitted to the Gynecology Outpatient Department of Niğde Ömer Halisdmir University Training and Research Hospital in Turkey between December 2019 and March 2020 for routine pregnancy follow-up. The study sample was calculated according to the sample size of an unknown population. Using the unknown population sample size formula with a 95% confidence interval, and t=1.96, p=0.816[4], and q=0.184, the minimum number of women required in the sample was found to be 231. All pregnant women who met the inclusion criteria of the study and agreed to participate were included in the study. The inclusion criteria of the study were: (1) being between the ages of 15-49, (2) being able to understand and answer the questions, (3) having attended previous routine pregnancy follow-ups, and (4) agreeing to participate in the study. No exclusion criteria were set, and pregnant women not matching the inclusion criteria were excluded. This study was completed with 502 pregnant women meeting the four inclusion criteria above.

Data Collection Tools

The study data were collected using the "Data Collection Form" prepared for the purposes of this study, the "Bristol Female Lower Urinary Tract Symptoms-Short Form" (BFLUTS-SF), and the "Toileting Behavior-Women's Elimination Behaviors Scale" (TB-WEBS). Turkish-validated versions of the BFLUTS-SF and TB-WEBS were used for data collection[17,18]. Patients also answered questions about demographic characteristics and obstetric features. The data collection form featured 36 questions regarding socio-demographic characteristics, pregnancy and labor, personal habits, chronic diseases, and urogynecological history.

The BFLUTS-SF was developed in 1996 by Jackson, Donovan, and Brookes[19] in order to investigate UI symptoms, other LUTS, and their effects on sexual function and quality of life. This questionnaire evaluates symptoms based on five dimensions: storage, voiding, urinary incontinence, sexual function, and quality of life. The BFLUTS-SF is valid and reliable; however, it does not have a cut-off value to detect the presence of LUTS in a clinical setting. Higher scores on this questionnaire indicate increased severity and perceived importance of LUTS-related symptoms[19].

The TB-WEBS was developed by Wang and Palmer[14]. In most countries, studies[20] have been reported to identify the relationship between women's toileting behaviors and UI using the TB-WEB scale. It consists of 18 questions divided into five sub-dimensions as follows: the preferred place for voiding, early voiding, delayed voiding, difficulty in voiding, and position preference for voiding. The answers to each question range from "never" to "always" and are scored between 1 and 5 points. The TB-WEBS also lacks a cut-off value. The higher one's score is, the more negative the toileting behavior[14].

Data Collection Procedure

A pilot study was conducted with 10 pregnant women in the obstetrics and gynecology outpatient clinics where the study was conducted in order to evaluate the clarity and reliability of the data collection form. The necessary changes were made after the pilot study in the data collection form. These 10 pregnant women were not included in the sample of the study. The convenience sampling method was collected from pregnant women's data. Data collection tools were applied between December 2019 and March 2020 in the obstetrics and gynecology outpatient clinics between 9.00-16.00 on weekdays by researchers. The pregnant women filled in the data collection forms themselves, the total time each woman spent was about 15-20 minutes.

Ethical Aspect of the Study

Before data collection, Ethics Committee approval was obtained from the Niğde Ömer Halisdemir University Ethics Committee (Decision No.: 2019/12-05, date: 29.11.2019). Written permission was obtained from the Health Directorate and the hospital where the study was conducted. All pregnant women were informed, and written consent was obtained from each participant.

Statistical Analysis

All statistical analyses were performed using SPSS (24.0, IBM Corp., Armonk, NY, USA). In the study, numbers, percentages, mean, standard deviation, maximum and minimum values were used as descriptive statistics. The normal distribution of the data in the comparative statistics was checked using the Shapiro-Wilk test. The Student's *t*-test was used to compare the BFLUTS-SF total scores according to the possible risk factors. The relationships between the BFLUTS-SF total scores and possible significant risk factors and the scores obtained from the TB-WEBS sub-dimensions were analyzed using Linear Regression Analysis with the stepwise method. A $p<0.05$ value was considered statistically significant. The relationship between the total and stub-dimension scores in the BFLUTS-SF and TB-WEBS was examined *via* Pearson's Correlation analysis.

Results

The gynecology clinic was visited by 12,867 women during the study period. Of the pregnant women visiting, 96.1% did not meet the inclusion criteria, and thus the study was completed with 502 participants. Patients' data regarding socio-demographic characteristics, pregnancy and labor, personal habits, chronic diseases and urogynecological history are presented in Table I. In terms of demographics, the mean age of the participants was 26.47±5.59 years, 22.5% had a university degree, 15.5% were employed and 28.1% of the pregnant women lacked any social security. As for the obstetric characteristics of the participants, it was found that 71.9% had conceived for the first time, the gestational week was greater than 28 weeks in 39.8% at study inclusion, a previous miscarriage was identified in 18.1% of the women, and 29.9% had given birth twice or more. It was noted that 52.9% of the women had given birth vaginally. Among these, 13.5% had experienced deliveries longer than 24 hours, 78.1% had had an episiotomy during labor, and the newborns weighed 4 kg or more in 13.0%. It was found that 26.8% of the women reported having experienced stress urinary incontinence (SUI) during their previous pregnancy, and 20.3% had these complaints after birth.

Of the participating women, 76.3% stated that they consumed at least 1,500 ml of liquids daily, 41.6% consumed coffee, and 9.2% continued to smoke. Chronic coughing was reported by 4.8% of the pregnant women, while 31.7% complained of constipation, 42% had a urinary tract infection (UTI), and 18.9% stated that their mothers or sisters had SUI. Overall, 26.5% of the participants reported seeking medical assistance because of LUTS, of which 57.9% had received treatment. The only preexisting LUTS in terms of UI were SUI. 26.8% of patients had SUI in their previous pregnancies, and 20.3% had previous postpartum SUI history (Table I).

Almost all women (99.0%) participating in the study reported having at least one LUTS during pregnancy. The most commonly affected LUTS dimension was storage in pregnant women (99.0%). The urgency was reported by 86.7% of the participants, nocturia by 66.7%, bladder pain by 66.1%, and 65.7% had frequency symptoms. The frequency of UI, SUI, urge incontinence (UUI), unpredictable incontinence, and nocturnal incontinence in pregnant women were 44.2%, 41.4%, 41.2%, 19.9%, and 8.2%, respectively. Among the symptoms mentioned during voiding, the frequency of hesitancy, intermittent stream, and straining were 37.8%, 35.5% and 21.3%, respectively. Urinary symptoms were stated by 18.3% of the women as adversely affecting their sex life, and 5.0% reported having urinary leakage during intercourse. Almost half (45.0%) of the women stated that their life was affected negatively by urinary incontinence, and 28.3% reported having problems during their daily work. In addition, 36.7% required a change of clothing, 29.9% restricted their daily fluid intake, and 42.4% avoided going to places without a restroom (Table II).

Table III shows the correlation between the TB-WEBS and BFLUTS-SF scores. There was no significant relationship between the scores of the pregnant women on the total, storage, voiding, sexual, and quality of life symptoms sub-dimensions of BFLUTS-SF and the scores of the TB-WEBS preferred place for voiding and position preference sub-dimensions for voiding ($p>0.05$). In our study,

Table I. Characteristics of pregnant women (n=502).

Variables	Mean±SD or n	Min-Max or %
Age (years)	**26.47±5.59**	**18-43**
Education		
Primary school	68	14.0
Secondary school	212	42.2
High school	109	21.7
University or higher	113	22.5
Employment status		
Working	78	15.5
Not working	424	84.5
Social security		
Yes	361	71.9
No	141	28.1
Gravida	**2.03±0.83**	**1-3**
1	361	71.9
≥2	141	28.1
Gestational week		
≤12 weeks	103	20.5
13-27th week	199	39.6
≥28 weeks	200	39.8
Spontaneous miscarriage		
Yes	91	18.1
No	411	81.9
Number of childbirths		
No child bearing	173	34.5
Has given one birth	179	35.7
Have given two or more births	150	29.9
Mode of delivery		
Vaginal birth	174	52.9
Cesarean section	137	41.6
Vaginal birth+ cesarean section	18	5.5
Labor taking longer than 24 hours		
Yes	26	13.5
No	157	81.8
Not knowing	9	4.7
Episiotomy		
Yes	150	78.1
No	31	16.1
Not knowing	11	5.7
History of a previous big baby		
Yes	11	13.0
No	148	84.4
Not knowing	33	2.6
SUI in previous pregnancy		
Yes	87	26.8
No	225	69.2
Not knowing	13	4.0

Continued

Table I (*Continued*). Characteristics of pregnant women (n=502).

Variables	Mean±SD or n	Min-Max or %
SUI in previous postpartum period		
Yes	66	20.3
No	251	77.2
Not knowing	8	2.5
Fluid intake (ml/day)		
≤500	24	4.8
501-1,499	95	18.9
≥1,500	383	76.3
Daily coffee consumption		
Yes	209	41.6
No	293	58.4
Smoking		
Never smoked	422	84.1
Smoking	46	9.2
Quit smoking	34	6.8
Chronic cough		
Yes	24	4.8
No	478	95.2
Constipation		
Yes	159	31.7
No	343	68.3
History of urinary tract infection		
Yes	211	42.0
No	260	51.8
Not knowing	31	6.2
SUI in the mother and/or sister		
Yes	95	18.9
No	299	59.6
Not knowing	108	21.5
Seeking medical assistance and treatment for LUTS		
Yes	133	26.5
No	369	73.5
Receiving treatment due to LUTS		
Yes	77	15.3
No	425	84.7

a positive and very weak significant relationship was found between the scores of the pregnant women on UI symptoms and the scores obtained on the total, early voiding, and delaying urination sub-dimensions of TB-WEBS ($p<0.05$). A positive and very weak significant difference was found between the scores of the pregnant women in the overall total, storage, UI, sexual and quality of life sub-dimensions of the BFLUTS-SF, and the overall total, early voiding, delayed urination, and difficulty in urination sub-dimensions of the TB-WEBS relationship ($p<0.05$). It was also found that there is a positive and very weak significant relationship between the voiding symptoms of women and their scores from the total, early urination, and delaying urination sub-dimensions of the TB-WEBS and a very weak but positive relationship with difficult urination ($p<0.05$).

In the Linear Regression Analysis (stepwise method), possible risk factors and the scores from the sub-dimensions of TB-WEBS were assessed to determine their effects on the total BFLUTS-SF score. Gestational week had a significant effect on the total scores obtained on the BFLUTS-SF [odds ratio (OR)=0.123, 95% Confidence Interval (CI): 0.022-0.248, $p=0.019$].

Table II. The prevalence of lower urinary tract symptoms among pregnant women.

Variables	n	%
At least 1 of LUTS (storage + voiding + urinary incontinence)	497	99.0
Storage Symptoms	**497**	**99.0**
Urgency	435	86.7
Nocturia (≥2 times)	335	66.7
Bladder pain	332	66.1
Frequency	330	65.7
Voiding Symptoms	**275**	**54.8**
Hesitancy	190	37.8
Intermittent stream	178	35.5
Straining	107	21.3
Urinary Incontinence Symptoms	**303**	**60.4**
Urinary incontinence	222	44.2
Stress urinary incontinence	208	41.4
Urge urinary incontinence	207	41.2
Unpredictable incontinence	100	19.9
Nocturnal incontinence	41	8.2
Sexual Function Symptoms	**99**	**19.7**
Sex life negatively affected by urinary symptoms	92	18.3
Leakage during sexual activity	25	5.0
Quality of life symptoms	364	72.5
Overall negative effect on life	226	45.0
Avoid places without toilets	213	42.4
Changing outer clothing necessary	184	36.7
Decreased fluid intake	150	29.9
Daily tasks affected	142	28.3

Table III. Correlation between Toileting Behavior-Women's Elimination Behaviors Scale and Bristol Female Lower Urinary Tract Symptoms-Short Form.

		TB-WEBS					
BFLUTS-SF		Place preference for voiding	Premature voiding	Delayed voiding	Strain for voiding	Position for voiding	Total score
Storage symptoms	*r*	0.000	0.136	0.014	0.138	0.037	0.114
	p	0.994	0.002	0.750	0.002	0.402	0.010
Voiding symptoms	*r*	0.019	0.144	0.181	0.283	-0.023	0.193
	p	0.677	0.001	<0.001	<0.001	0.611	<0.001
Urinary incontinence symptoms	*r*	0.012	0.131	0.107	0.014	0.015	0.110
	p	0.780	0.003	0.017	0.750	0.733	0.014
Sexual function symptoms	*r*	0.022	0.099	0.114	0.118	0.056	0.140
	p	0.623	0.026	0.011	0.008	0.211	0.002
Quality of life symptoms	*r*	0.041	0.174	0.116	0.125	0.047	0.179
	p	0.359	<0.001	0.009	0.005	0.298	<0.001
Total score	*r*	0.024	0.196	0.128	0.160	0.031	0.190
	p	0.594	<0.001	0.004	<0.001	0.491	<0.001

BFLUTS-SF, Bristol Female Lower Urinary Tract Symptoms-Short Form; TB-WEBS, Toileting Behavior-Women's Elimination Behaviors Scale.

Table IV. The linear regression analysis for the variables influencing the BFLUTS-SF scores of pregnant women.

	B1 (95% CI)	SE	B2	*t*	*p*	Zero-Order	Partial
Constant	2.157 (2.003 - 2.312)	0.079		27.465	**<0.001**		
SUI history in the postnatal period	0.344 (0.169 - 0.519)	0.089	0.262	3.869	**<0.001**	0.398	0.226
History of a urinary tract infection	0.166 (0.055 - 0.278)	0.056	0.154	2.948	**0.003**	0.200	0.174
SUI history in previous pregnancy	0.222 (0.063 - 0.382)	0.081	0.186	2.740	**0.007**	0.389	0.162
Premature voiding	0.023 (0.006 - 0.039)	0.008	0.140	2.659	**0.008**	0.207	0.157
Third trimester of pregnancy	0.135 (0.022 - 0.248)	0.057	0.123	2.357	**0.019**	0.123	0.140

CI: confidence interval; SUI: stress urinary incontinence; BFLUTS-SF, Bristol Female Lower Urinary Tract Symptoms-Short Form; B_1: unstandardized coefficient; B_2: standardized coefficient; SE: standard error; F= 18.716; $p<0.001$; Adj. $R^2=0.238$; Durbin-Watson: 2.022.

The total BFLUTS-SF score of pregnant women at 28 weeks of gestation at least was 0.135 points higher than pregnant women at 13-28 weeks of gestation. The total BFLUTS-SF score of those with SUI history in their previous pregnancy was 0.222 points higher than the pregnant women with no SUI history in their previous pregnancies and was statistically significant (OR=0.186, 95% CI: 0.063-0.382, $p=0.007$). The total BFLUTS-SF score of those with a history of SUI in their previous postpartum period was 0.344 points higher than pregnant women who did not have a history of SUI in their previous postpartum period (OR=0.262, 95% CI: 0.169-0.519, $p<0.001$). The total BFLUTS-SF score of those with UTI history was 0.166 points higher than those who did not have UTI history (OR=0.154, 95% CI: 0.055-0.278, $p=0.003$). It was found that BFLUTS-SF significantly increased the total score by 0.023 points (Table IV).

Discussion

This study was conducted as no study was found to examine the relationship between toileting behavior and the other factors influencing the development of LUTS in pregnant women. The aim was to investigate the prevalence of LUTS in pregnant women, the influencing risk factors and the relationship between the symptoms and toileting behaviors. The presence of LUTS negatively affects the lives of women physically, psychologically, socially and economically[9]. It is one of the most common problems experienced by pregnant women[6]. Different studies[3,4] report that the prevalence of at least one symptom of LUTS is between 78.6% and 89.2%. In this study, almost all (99%) pregnant women had at least one symptom. The higher prevalence of LUTS in pregnant women compared to those reported in other studies[3,4] could be due to the differences in the measurement tools used, the population, and the methodology of the studies.

The storage-related symptoms observed for urine in the bladder are frequency, nocturia, urgency, UI, and bladder tenderness/pain[2]. Almost all (99.0%) pregnant women in our study also had storage-related symptoms. The most common storage symptoms in pregnant women were found to be urgency, nocturia, pain in the bladder, and frequency and we investigated these symptoms with the following questions: "Do you have to rush to the toilet to urinate?", "During the night, how many times do you have to get up to urinate, on average?", "Do you have pain in your bladder?" and "How often do you pass urine during the day?". In studies[3,5,6,16] evaluating LUTS in pregnant women with different measurement tools, the most common symptom was often noted as nocturia, although the overall frequency of storage symptoms varied from study to study. In a study by Sun et al[21], the most common storage symptom was urgency, similar to our findings. The high frequency of urgency in our study could be due to positive UTI history in approximately one-quarter of our study group, and approximately 40% of the pregnant women were in their third trimester.

Compared to storage symptoms, excretory symptoms are observed less frequently in pregnant women[5]. In our study, 37.8% of the pregnant women had hesitancy, 35.5% had an intermittent stream, and 21.3% had straining. In the studies examining LUTS in pregnant women, the incidence of hesitancy, intermittent stream, and straining were 6.9-18.4%[3,16], 13.2-17.5%[3,5,] and 3.9-15.3%[3-5,16], respectively. The excretory symptoms found in our study were higher than those in other studies[3-5,16]. This could be due to the difference in the study population and the methodology.

Urinary incontinence, defined as uncontrolled involuntary urination[2], is common in pregnant women and negatively affects their quality of life. The incidence of UI appears to increase slightly in the early pregnancy period, but more problems occur more frequently with increased gestational week[12]. In our study, the frequency of UI, UUI, SUI, unpredictable incontinence, and nocturnal incontinence was 44.2%, 41.4%, 41.2%, 19.9%, and 8.2%, respectively. According to different studies[3-6,16,21], although there are differences in the prevalence of UI, the most common UI type in pregnant women is SUI. Our research findings are similar to those reported in prior publications on this topic[1,2,12] and other studies[3-6,16,21].

Urinary incontinence, which is a LUTS symptom, adversely affects the quality of life and sexual functions of women. Mixed urinary incontinence, in particular, is noted to be a greater cause of sexual dysfunction for women[22].

Women with LUTS and UI experience sexual dysfunction more frequently when compared to the general population[7]. In our study, 19.7% of pregnant women reported that they experienced symptoms related to sexual intercourse. 72.5% of them reported that the symptoms affected their quality of life. In a study[3] examining LUTS among adolescent pregnant women, 11.2% were found to have symptoms related to sexual function, and 36.9% had symptoms adversely affecting the quality of life. The high prevalence of symptoms related to sexual function and quality of life may be due to the higher number of pregnancies and deliveries and higher awareness of LUTS in the patients in our study compared to adolescents.

The development of LUTS in women has a multifactorial etiology that includes conditions such as pregnancy[8]. As the gestational week progresses, the prevalence of LUTS in pregnant women increases[7]. In the present study, there was a statistically significant relationship between gestational week and the total scores obtained on the BFLUTS-SF ($p<0.05$). In addition, the total BFLUTS-SF score of those in the third trimester of pregnancy was 0.135 points higher than those in the first or second trimester, indicating a significant difference ($p<0.05$). In a study by Sun et al[21], it was found that the incidence of nocturia, SUI, urgency, and frequency increased as the gestational week progressed in pregnant women. Our research findings are similar to those in the literature[7] and the study by Sun et al[21].

Urinary tract infections such as cystitis and urethritis affect the functions of the bladder and particularly cause the storage symptoms of LUTS[7]. Because the detrusor muscle is activated in the presence of UTI, alpha-adrenergic receptors are suppressed in the urethra, thereby decreasing sphincter pressure, which can lead to UUI development[23]. In our study, the total BFLUTS-SF score of pregnant women complaining of UTI was 0.166 points higher than those who did not suffer from UTI, indicating a significant relationship ($p<0.05$). In a study by Timur-Taşhan et al[24], it was found that repetitive UTI increased the risk of LUTS development 2.93-fold. Our research findings are compatible with the literature[7,23] and the study by Timur-Taşhan et al[24].

It is known[1] that there is a statistically significant relationship between the presence of UI during pregnancy and having experienced SUI during the previous pregnancy or after birth. In our study, the total BFLUTS-SF score of those who had had SUI during their previous pregnancy or at postpartum increased by 0.222 and 0.344 points, respectively, with a significant relationship between them ($p<0.05$). In a study by Ankazu et al[25], a significant relationship was found between the presence of LUTS and the findings reported in previous pregnancies. Our results are similar to those reported by prior studies[1,25].

Toileting behavior describes the physiological emptying of the bladder, including the location, time, position and style of urination, as well as many voluntary actions[14]. A healthy toileting behavior includes a comfortable position for urination, sufficient time to relax the pelvic floor and complete the emptying of the bladder. Individuals can acquire unhealthy voiding habits, such as actively increasing intraabdominal pressure (valsalva) without relaxing the pelvic floor, and may be accustomed to voiding in this uncomfortable manner[11]. The lifestyle and toileting behavior of women can also alter voiding in terms of speed (rushing) and bladder function[15]. Early, delayed, or forced urination are among the unhealthy toilet behaviors[26]. Early urination is the development of a urination habit when there is less than 260 ml of urine in the bladder[14]. Although it is stated that premature voiding can reduce unwanted

discharge in the short term, it can also increase the sensitivity of the bladder and cause LUTS in the long term. In our study, we revealed a significantly higher rate of premature voiding among pregnant women. In pregnant women, the vascular supply of the bladder increases due to physiological, mechanical, and hormonal effects of pregnancy; the bladder moves forward and upward and becomes hypotonic, edematous, and concave in shape; the detrusor muscle becomes more hypertrophic, and we see alterations in the neuromuscular and connective tissues that surround the bladder neck and urethra that control their function. Therefore, we think that all of these changes in pregnancy affect the lower urinary system and can result in the development of premature voiding[3]. Delayed urination, known as infrequent urination or lazy bladder syndrome[26], describes women's behaviors to inhibit the urge to urinate and delay urination[27]. In our study, it was found that higher BFLUTS-SF scores, namely the severity and importance of the perceived symptoms, indicated worse cases of early urination, delayed urination, difficulty in urination and general toilet behavior ($p<0.05$). In addition, according to the regression analysis, a significant relationship was found between the TB-WEBS early voiding sub-dimension score and the total BFLUTS-SF score in our study ($p<0.05$). Similar to our research results, in a study[26] conducted with nurses, it was determined that unhealthy toilet behaviors (early urination, delayed voiding and straining voiding) are associated with LUTS. In another study[28] conducted with young women, a statistically significant relationship was found between incontinence, discharge and frequency, and early voiding, delayed voiding and straining voiding.

Our study has a couple of noteworthy strengths. The first is that the data were collected using standard, valid and reliable scales. The other is that the study sample size is relatively large. Our study also has some limitations. This cross-sectional study offers results from a certain time period. Since the results could vary based on the time and the population, it is hard to establish causality. The fact that the data was provided by pregnant women based on their personal recollection could cause a bias. The study was conducted on pregnant women at a training and research hospital in Turkey. Therefore, the results can only be generalized to the population in question. Another important limitation is that since there was no access to the women's urine samples, we were not able to verify orally reported UTIs clinically. This makes it challenging to clearly establish a relationship between LUTS and UTIs.

Conclusions

In conclusion, it was found in this study that almost all pregnant women had LUTS and storage symptoms. Approximately 1 in every 5 pregnant women presented with these problems and the quality of life of 7 out of 10 women were adversely affected. It was determined that the severity of LUTS symptoms worsened with premature voiding, delayed voiding and straining voiding, which are unhealthy toilet behaviors[26]. According to our study, premature voiding, UTI history, being in the third trimester of pregnancy, presence of SUI (in previous pregnancies and postpartum) played a role in the development and severity of LUTS.

These results indicate that the awareness of pregnant women should be increased about the diagnosis, treatment and prevention of LUTS by considering risk factors. Health professionals should provide training and counseling to help pregnant women gain healthy bladder behavior or habits in order to prevent LUTS during pregnancy and to reduce its severity. Using more objective tools like urine samples, standardized scales, and including pregnant women from multiple centers and various cultures could contribute to identifying the prevalence of LUTS, its risk factors and the relationship between symptoms and toileting behavior, thereby ensuring that strategic treatments are developed. Since studies on the effects of toileting behaviors in the development or prevention of LUTS in pregnant women are lacking, in the future, it would be beneficial to conduct cross-sectional and experimental studies on this subject.

Acknowledgments
We thank our patients for participating in the study.

Conflict of Interest
The Authors declare that they have no conflict of interest.

Funding
No financial support was received from any institution or organization.

Ethics Approval
Ethics committee approval was obtained from the Niğde Ömer Halisdemir University Ethics Committee (Decision No.: 2019/12-05, date: 29.11.2019).

Informed Consent
An informed consent form was obtained from the participants before participating in the study.

Availability of Data and Materials

The authors give their consent for the article publication.

Authors' Contributions

Emre Destegül: Data collection. Manuscript writing/editing
Adem Yavuz: Data collection, Data analysis
Semra Kocaöz: Project Development, manuscript writing
Pınar Kara: Data analysis, methodology.

ORCID ID

Emre Destegül: 0000-0001-5726-0223
Semra Kocaöz: 0000-0003-1698-6305
Pınar Kara: 0000-0001-6710-6713
Adem Yavuz: 0000-0003-4191-4004

References

1) Kocaoz S, Talas MS, Atabekoglu CS. Urinary incontinence in pregnant women and their quality of life. J Clin Nurs 2010; 19: 3314-3323.
2) Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U, Van Kerrebroeck P, Victor A, Wein A, Standardisation Sub-Committee of the International Continence S. 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.
3) Aydin A, Kocaoz S, Kara P. Prevalence of Lower Urinary Tract Symptoms in Pregnant Adolescents and the Influencing Factors. J Pediatr Adolesc Gynecol 2020; 33: 160-166.
4) Balik G, Guven ES, Tekin YB, Senturk S, Kagitci M, Ustuner I, Mete Ural U, Sahin FK. Lower Urinary Tract Symptoms and Urinary Incontinence During Pregnancy. Low Urin Tract Symptoms 2016; 8: 120-124.
5) Liang CC, Chang SD, Lin SJ, Lin YJ. Lower urinary tract symptoms in primiparous women before and during pregnancy. Arch Gynecol Obstet 2012; 285: 1205-1210.
6) Lin KL, Shen CJ, Wu MP, Long CY, Wu CH, Wang CL. Comparison of low urinary tract symptoms during pregnancy between primiparous and multiparous women. Biomed Res Int 2014; 2014: 303697.
7) Takahashi S, Takei M, Nishizawa O, Yamaguchi O, Kato K, Gotoh M, Yoshimura Y, Takeyama M, Ozawa H, Shimada M, Yamanishi T, Yoshida M, Tomoe H, Yokoyama O, Koyama M. Clinical Guideline for Female Lower Urinary Tract Symptoms. Low Urin Tract Symptoms 2016; 8: 5-29.
8) Coyne KS, Kaplan SA, Chapple CR, Sexton CC, Kopp ZS, Bush EN, Aiyer LP, Epi LT. Risk factors and comorbid conditions associated with lower urinary tract symptoms: EpiLUTS. BJU Int 2009; 103 Suppl 3: 24-32.
9) Bradway C, Coyne KS, Irwin D, Kopp Z. Lower urinary tract symptoms in women-a common but neglected problem. J Am Acad Nurse Pract 2008; 20: 311-318.
10) Palmer MH, Athanasopoulos A, Lee KS, Takeda M, Wyndaele JJ. Sociocultural and environmental influences on bladder health. Int J Clin Pract 2012; 66: 1132-1138.
11) Palmer MH, Newman DK. Women's toileting behaviours: an online survey of female advanced practice providers. Int J Clin Pract 2015; 69: 429-435.
12) FitzGerald MP, Graziano S. Anatomic and functional changes of the lower urinary tract during pregnancy. Urol Clin North Am 2007; 34: 7-12.
13) Saffarini JH, Ahmad QT, Samara AM, Jabri DS, Safarini ZH, Banijaber YM, Jaradat A, Abushamma F, Zyoud SH. Assessment of lower urinary tract symptoms during pregnancy: an observational cross-sectional study from Palestine. BMC Pregnancy Childbirth 2021; 21: 84.
14) Wang K, Palmer MH. Women's toileting behaviour related to urinary elimination: concept analysis. J Adv Nurs 2010; 66: 1874-1884.
15) Burgio KL, Newman DK, Rosenberg MT, Sampselle C. Impact of behaviour and lifestyle on bladder health. Int J Clin Pract 2013; 67: 495-504.
16) Adaji SE, Shittu OS, Bature SB, Nasir S, Olatunji O. Bothersome lower urinary symptoms during pregnancy: a preliminary study using the International Consultation on Incontinence Questionnaire. Afr Health Sci 2011; 11 Suppl 1: S46-S52.
17) Parlas M, Bilgic D, Dissiz M. Reliability and validity of the Toileting Behaviors-Women's Elimination Behaviors scale in a Turkish pregnant population. Int Urogynecol J 2023. doi: 10.1007/s00192-023-05511-7. Online ahead of print.
18) Erbay ME, Tarhan ST. Reliability and validity of the Turkish language version of the Core Lower Urinary Tract Symptom Score. Low Urin Tract Symptoms 2022; 14: 421-426.
19) Jackson S, Donovan J, Brookes S, Eckford S, Swithinbank L, Abrams P. The Bristol Female Lower Urinary Tract Symptoms questionnaire: development and psychometric testing. Br J Urol 1996; 77: 805-812.
20) So A, De Gagne JC, Park S. Validity and Reliability of the Korean Version of the Women's Toileting Behavior Scale. Int Neurourol J 2019; 23: 151-160.
21) Sun MJ, Chen GD, Chang SY, Lin KC, Chen SY. Prevalence of lower urinary tract symptoms during pregnancy in Taiwan. J Formos Med Assoc 2005; 104: 185-189.
22) Mota RL. Female urinary incontinence and sexuality. Int Braz J Urol 2017; 43: 20-28.
23) Moore EE, Jackson SL, Boyko EJ, Scholes D, Fihn SD. Urinary incontinence and urinary tract infection: temporal relationships in postmenopausal women. Obstet Gynecol 2008; 111: 317-323.
24) Timur-Tashan S, Beji NK, Aslan E, Yalcin O. Determining lower urinary tract symptoms and asso-

ciated risk factors in young women. Int J Gynaecol Obstet 2012; 118: 27-30.

25) Anzaku AS, Mikah S, Utoo B. Prevalence and determinants of lower urinary tract symptoms before and during pregnancy in a cohort of Nigerian women. Sahel Medical Journal 2014; 17: 96-101.

26) Wan X, Wu C, Xu D, Huang L, Wang K. Toileting behaviours and lower urinary tract symptoms among female nurses: A cross-sectional questionnaire survey. Int J Nurs Stud 2017; 65: 1-7.

27) Wang K, Palmer MH. Development and validation of an instrument to assess women's toileting behavior related to urinary elimination: preliminary results. Nurs Res 2011; 60: 158-164.

28) Sjogren J, Malmberg L, Stenzelius K. Toileting behavior and urinary tract symptoms among younger women. Int Urogynecol J 2017; 28: 1677-1684.