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Evaluation of urinary incontinence risk factors in pregnancy

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Abstract

The objective of this study was to examine urinary incontinence (UI) during pregnancy. Patients were assessed within 24–48 hours postpartum. Demographic and clinical data were obtained from records. Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-SF) and the Urinary Distress Inventory– 6 (UDI-6) scales were administered. In this cross-sectional study, UI was identified in 43.7% of participants (n = 206). The third trimester was the most common period for UI onset (35.9%). Mean ICIQ-SF and UDI-6 scores varied by trimester (ICIQ-SF: 8.80, 6.27, and 6.93; UDI-6: 44.44, 35.86, and 39.41, respectively; p = 0.001). In multivariable analysis, parity was identified as an independent variable (aOR = 1.40; 95% CI: 1.01–1.95; p = 0.046), and caffeine intake showed a borderline association (aOR = 3.04; 95% CI: 0.99–9.33; p = 0.052). UI affected nearly half of pregnant women in this cohort, with most cases occurring in late gestation. These findings support routine antenatal screening and counselling for pelvic floor symptoms.

Keywords: Urinary incontinence, pregnancy, Incontinence Questionnaire-Urinary Incontinence Short Form, Urinary Distress Inventory– 6

Introduction

Urinary incontinence (UI) is a common health issue worldwide. This problem impact an individual's physical health as well as their social and mental well-being [1]. A lot of women have this problem for the first time when they are pregnant. During this time, the body goes through a lot of changes. In particular, increased pressure in the abdominal area due to rising progesterone levels and the growing uterus. These changes can make it difficult to control the bladder, which may lead to incontinence [2].

In addition, elevated levels of the relaxin hormone during pregnancy and changes in collagen synthesis reduce the supportive strength of the pelvic floor muscles, thereby negatively affecting urinary continence. For this reason, pregnancy is considered a significant risk factor for UI [3]. Research indicates that this condition impacts over fifty percent of pregnant women and reaches its highest frequency in the third trimester [4-5]. However, research on risk factors for UI during pregnancy remains limited compared to studies on older women [6]. Identifying risk factors associated with UI during pregnancy will provide important information that will support informed decision-making processes for both healthcare professionals and pregnant women. This will enable the early implementation of non-invasive preventive interventions, such as pelvic floor muscle exercises, to prevent incontinence that may occur, especially in late pregnancy and the postpartum period.

Although UI is not a life-threatening health condition, it can have multifaceted and significant negative effects on an individual's quality of life. It may reduce quality of life across a wide range of domains, including physical mobility, psychological well-being, social interactions, and lifestyle choices. In particular, daily activities such as exercising and travelling may be restricted due to fear of incontinence; many women may choose to stay at home for this reason [7]. The current literature shows that this condition most significantly affects psychological and social functioning. Feelings of

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shame, embarrassment, and social withdrawal associated with UI can lead to isolation and, over time, may contribute to the development of depression [8]. Many women report compensatory behaviors— restricting fluid intake, planning proximity to restrooms, or using absorbent pads—that can inadvertently affect hydration and mobility [9]. Furthermore, these aspects of quality of life can interact, creating a complex relationship that presents challenges.

The pregnancy period brings major physical and emotional adjustments for women.

Seeking medical advice for urinary symptoms this period can increase awareness of incontinence. Early consultation also allows timely preventive actions. However, the literature on help-seeking behaviour during pregnancy is limited. To date, only one study on this topic has reported that a small proportion of pregnant women seek healthcare services for urinary incontinence. Common barriers include normalization of leakage as an expected part of pregnancy, concerns about embarrassment, and uncertainty about which professional to consult [10]. Significant differences in reasons for seeking help are also observed between countries due to the influence of different sociocultural factors. Despite the high prevalence of UI during pregnancy, awareness of its preventability remains low, making it difficult to implement early preventive measures effectively.

This study aims to determine the prevalence of UI during pregnancy and its associated risk factors. The findings may contribute to the development of strategies for preventing incontinence during pregnancy and improving quality of life during this period.

Material and Methods

This cross-sectional study was conducted at the obstetrics department of our institution. Ethical approval was obtained from Ethics Committee of Ankara Etlik City Hospital (February 28, 2024; Approval No: AEŞH-BADEK-2024-200), designed in accordance with ethical guidelines and conducted in accordance with the Declaration of Helsinki.

A total of 206 women who gave birth at our hospital within a 5-month period were included. Participants were consecutively enrolled from eligible postpartum women during the accrual period. Those with maternal or fetal pathology, multiple pregnancies, systemic disease, active urinary tract or genital infection, known urinary system pathology or surgical history were excluded from the study. In addition, cases whose medical records could not be accessed, who were followed up at another health centre or who gave birth at a different centre were also excluded. The sampling frame comprised in the hospital postpartum clinic and eligibility screening was performed against predefined inclusion and exclusion criteria. A screening log documenting reasons for non-enrolment (e.g., early discharge, refusal) was maintained to reduce selection bias and to characterise the study population.

The questionnaires were administered face-to-face by trained healthcare staff in the postpartum clinic within 24–48 hours of delivery. The same postpartum window was chosen to standardise timing of assessment across participants and to minimise recall bias while ensuring clinical stability. Demographic and clinical data for the participants were obtained from patient files. To assess urinary incontinence, the International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-SF) and the Urinary Distress Inventory Short Form (UDI-6) were administered to all participants.

The ICIQ-SF scale is widely used in research and clinical practice to measure the frequency, severity, and impact on quality of life of UI in patients. It was defined in 1999. According to the International Continence Society (ICS) guidelines, it has A-level validity [11]. The scale consists of four items: frequency of incontinence, amount of urine lost, impact on quality of life, and the patient's self-assessment. All questions are scored using a 5-point Likert scale. The total score ranges from 0 to 21, with higher scores indicating more severe symptoms. The cutoff point used to distinguish between women with and without incontinence is 6. In analyses, the ICIQ-SF total was treated as a continuous measure of severity and dichotomised at ≥6 for prevalence estimates, with item-level distributions examined descriptively for completeness.

The UDI-6 is the short version of the UDI, a quality of life scale, that was introduced in 1994. Currently, UDI-6 is used much more frequently than the long version because of its applicability. According to the International Consultation on Incontinence recommendations, the instrument has A-level evidence [12]. The UDI-6 consists of six items. These items are frequent urination, incontinence due to a sense of urgency, incontinence due to activity, a small amount of incontinence (drops) with coughing or sneezing, difficulty in emptying the bladder, and pain or discomfort in the lower abdomen or genital area. Each item is scored from 0 to 3, yielding a raw total score ranging from 0 to 18. Higher scores on the UDI-6 indicate higher severity. To improve comparability with previous studies, raw UDI-6 scores were subsequently normalized to a 0–100 scale using the formula: (raw score / 18) × 100.

The most important indicator of the reliability of the scales is the value of the Cronbach alpha coefficient. According to original validation study of the scale, the Cronbach's alpha value was found to be 0.73 in the pre-treatment sample group and increased to 0.90 in the post-treatment group. These results indicate that the scale has high reliability. In the Turkish language adaptation of the scale, the Cronbach's alpha coefficient was calculated as 0.810, and it was determined that both the Turkish versions of the UDI-6 and ICIQ-SF scales offer a high level of reliability. Internal consistency in the present sample was also evaluated using Cronbach’s alpha with 95% confidence intervals to allow comparison with prior validation work.

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Statistical Analysis

Statistical analyses were performed using SPSS version 31.0 (IBM Corp., Armonk, NY, USA). The normality of numerical variables was assessed using the Shapiro–Wilk test. Numerical data were presented as mean ± standard deviation for normally distributed variables and as median (minimum–maximum) for non-normally distributed variables. For comparisons among four groups, the One-Way ANOVA test was applied to normally distributed variables. Post-hoc analyses were performed using the Tukey test when the homogeneity of variances was met, and the Games–Howell test when this assumption was violated. For non-normally distributed variables, the Kruskal–Wallis test was used. In post-hoc pairwise comparisons of non-parametric results and categorical variables, Bonferroni correction was applied, and the adjusted level of significance was set at $p < 0.0083$. Categorical variables were expressed as number and percentage (%), and comparisons among groups were performed using the Chi-square or Fisher's exact test, followed by Bonferroni-adjusted post-hoc tests when applicable. To identify independent factors associated with urinary incontinence, univariable and multivariable logistic regression analyses were conducted. Variables with a p-value <0.10 in univariable analysis were included in the multivariable model. The multivariable model was constructed using the backward likelihood ratio (LR) method, and results were expressed as odds ratios (OR / aOR) with 95% confidence intervals (CI). A two-tailed p-value <0.05 was considered statistically significant unless otherwise specified.

Table 1. Comparison of demographic and clinical characteristics of patients with and without urinary incontinence in pregnancy

Variables	No Incontinence (n=116)	1st Trimester Incontinence (n=5)	2nd Trimester Incontinence (n=11)	3rd Trimester Incontinence (n=74)	p-value
Age	28 (16-38)	28 (25-37)	27 (19-33)	27 (19-47)	0.736[a]
BMI kg/m2	28.24 ± 3.80	30.07 ± 4.53	28.06 ± 3.45	29.32 ± 4.84	0.290[b]
Gravida	2(1-6)	2(1-4)	1(1-5)	2(1-8)	0.073[a]
Parity	1(1-5)	1(1-4)	1(1-3)	2(1-4)	0.011[a]
Mode of Birth					
Vaginal Birth	68 (%58.6)	2 (%40)	6 (%54.5)	52 (%70.3)	0.261[c]
C-Section	48 (%41.4)	3 (%60)	5 (%45.5)	22 (%29.7)	
Smoking	10 (%8.6)	1 (%20)	5 (%45.5)	8 (%10.8)	0.009[c]
Caffeine intake					
0-5 cups/day	111 (%95.7)	4 (%80)	9 (%81.8)	67 (%90.5)	0.069[c]
>5 cups/day	5(%4.3)	1 (%20)	2 (%18.2)	7 (%9.5)	
Ethnicity					
Turkish	104 (%89.7)	5 (%100)	11 (%100)	71(%95.9)	0.323[c]
Others	12 (%10.3)	-	-	3 (%4.1)	
Education Status					
None	8 (%6.9)	-	-	-	0.022[c]
Primary School	32 (%27.6)	2 (%40)	3 (%27.3)	21 (%28.4)	
High School	54 (%46.6)	1 (%20)	5 (%45.5)	23 (%31.1)	
University	22 (%19.0)	2 (%40)	3 (%27.3)	30 (%40.5)	
Birth Weight (g)	3304 ± 279	3495 ± 241	3358 ± 309	3361 ± 303	0.317[b]
UDI-6 Score	17.10 ± 12.52	44.44 ± 26.35	35.86 ± 12.26	39.41 ± 16.68	<0.001[b]
ICIQ-SF Score	0 (all values = 0)	8.80 ± 4.86	6.27 ± 3.00	6.93 ± 4.15	<0.001[b]

Note: Post-hoc pairwise comparisons for variables with significant overall group differences are reported in the results section;
[a]: Continuous variables are presented as median (min–max). Group comparisons were performed using the Kruskal–Wallis test;
[b]: Continuous variables are presented as mean ± standard deviation. Group comparisons were performed using one-way ANOVA;
[c]: Categorical variables are presented as n (%), and group comparisons were performed using the Chi-square test;
BMI: Body mass index; UDI-6: Urogenital distress inventory; ICIQ-SF: International consultation on incontinence questionnaire

Table 2. Univariable and multivariable logistic regression analysis of factors associated with urinary incontinence during pregnancy

Variables	Univariable			Multivariable		
	OR	95% CI	p-value	aOR	95% CI	p-value
Age	1.023	0.972-1.077	0.377			
Parity	1.362	0.982-1.887	0.064	1.400	1.007-1.947	0.046
Smoking	1.953	0.824-4.630	0.129			
BMI (kg/m2)	1.057	0.989-1.130	0.103			
High caffeine intake (>5 cups/day)	2.775	0.913-8.432	0.072	3.040	0.991-9.329	0.052
Birth Weight (g)	1.001	1.000-1.002	0.113			

Note: The multivariable model was constructed using backward likelihood ratio (LR) logistic regression;
OR: Odds ratio; CI: Confidence interval; aOR: Adjusted odds ratio; BMI: Body mass index

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Results

A total of 206 participants were included in the study. Urinary incontinence was not present in 116 women (56.3%), while 90 women (43.7%) reported postpartum urinary incontinence. Among those with incontinence, symptoms began in the first trimester in 5 women (2.4%), in the second trimester in 11 women (5.3%), and in the third trimester in 74 women (35.9%). All demographic and clinical characteristics are presented in Table 1.

There were no significant differences among the groups with respect to age, BMI, or gravidity (p=0.736, p=0.290, and p=0.073, respectively). Parity differed significantly among groups (p=0.011). Pairwise comparisons showed differences between the no-incontinence and third trimester groups, and between the second and third trimester groups (p=0.009 and p=0.011, respectively); however, these differences did not remain significant after Bonferroni correction (adjusted significance threshold <0.0083).

Mode of birth did not differ between groups (p=0.261). Smoking status differed significantly among groups (p=0.009), and after Bonferroni correction, the difference between the no-incontinence group and the second trimester group remained significant (p=0.004). Educational status also differed (p=0.022), with only the comparison between the no-incontinence and third trimester groups remaining significant after Bonferroni adjustment (p<0.001). Birth weight was similar between groups (p=0.317).

UDI-6 and ICIQ-SF scores were significantly higher in women with urinary incontinence compared to those without (both p<0.001). All women without incontinence had an ICIQ-SF score of 0. Because variance homogeneity assumptions were not met, Games–Howell post-hoc testing was applied; UDI-6 and ICIQ-SF scores were significantly higher in the second and third trimester groups compared to the no-incontinence group (UDI-6: p=0.002 and p<0.001; ICIQ-SF: both p<0.001). No significant differences were observed among the incontinence groups themselves.

To identify factors associated with postpartum urinary incontinence, univariable and multivariable logistic regression analyses were performed (Table 2). In the univariable analysis, parity, smoking, BMI, and high caffeine intake (>5 cups/day) showed borderline associations with incontinence (p=0.064, p=0.129, p=0.103, and p=0.072, respectively). In the multivariable model, parity remained independently associated with urinary incontinence (aOR=1.400, 95% CI: 1.007–1.947, p=0.046). High caffeine intake demonstrated a borderline association (aOR=3.040, 95% CI: 0.991–9.329, p=0.052). Age, smoking, BMI, and birth weight were not significant in the adjusted model. The multivariable analysis was conducted using the backward likelihood ratio (LR) selection method.

Discussion

This study analysed the frequency of urinary incontinence (UI) during pregnancy, UI risk factors and differences according to the trimester in which symptoms began were evaluated by using the ICIQ-SF and UDI-6 questionnaires. According to the findings of our study, UI is quite common during pregnancy, and symptoms most often begin in the third trimester. Multiparity were found to be risk factors for UI in pregnancy (aOR = 1.40; 95% CI: 1.01–1.95; p = 0.046). Also caffeine intake showed a borderline association (aOR = 3.04; 95% CI: 0.99–9.33; p = 0.052). These results emphasize the clinical need to monitor pelvic floor symptoms more closely as pregnancy progresses, particularly in women with identified risk factors.

In this study, prevalence of incontinence was determined to be 42.9%. In a meta-analysis conducted by Kaya et al., the prevalence of UI during pregnancy ranged from 12.9% to 62.8%; according to the combined results of studies conducted in Turkey, this rate was reported to be 35% [13]. In a separate meta-analysis of 44 studies totalling 88,305 participants, the mean prevalence of incontinence was reported to be 41%; in individual studies, rates ranged from 9% to 75% [10]. A cross-sectional study among pregnant women found a prevalence of 28% [14]. Another study that included only primiparous women reported a slightly higher rate of 38.7% [15]. The difference in these rates is mostly due to the inconsistency of the methods used in the studies. For example, some studies evaluate both the frequency and severity of symptoms using scales. Others, however, identify incontinence solely based on patients' self-reports. This limits the comparability of the data. Therefore, it is important to standardise assessment tools and diagnostic criteria to increase the reliability of epidemiological findings in the field.

As pregnancy progresses, an increase in urinary incontinence is observed alongside increasing physiological changes [16]. In this study, the prevalence of UI in the first trimester was found to be 2.4%. In a meta-analysis conducted by Kaya et al., this rate was reported to be 11% in the first trimester [13]. On the other hand, in separate studies conducted by Okunola and Jean-Michel, UI was not observed in any of the pregnant women in the first trimester [14,17]. These findings support that the probability of developing UI increases significantly with the increase in hormonal changes and mechanical pressure as the gestational week progresses.

When assessed by the trimester in which UI symptoms began, UI in the second trimester was found to be 5.3%. In a meta-analysis conducted in Turkey, this rate was reported to be 11% [13]. In the study by Okunola et al., this rate was found to be 24.1%; in the study by Jean-Michel et al., it was 20%; in the study by Chang et al., it was 58.7%; and in the study by Rogers et al., it was 44% [5,10,14,18]. Although our data are consistent with some studies in the literature, there are also significant differences. The low rate in Turkey can be considered a positive development; however, this difference may be related to the scarcity of data specific to the second trimester. In addition, cultural factors, differences in the reporting of symptoms, and

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differences in healthcare-seeking behaviour may also partially explain this difference.

It was found that in 35.9 % of cases, symptoms began in the third trimester. A meta-analysis conducted in Turkey reported this rate as 32% [13]. In the literature, the frequency of UI in the third trimester can vary between 30% and 80% [5,10,14,17]. Physiological changes to the —such as increased weight gain, hormonal fluctuations, and increased pressure on pelvic floor structures—may contribute to this increase. The relatively high rate found in our study is striking compared with previous reports. This difference may reflect cultural or societal factors that influence how women perceive and report their symptoms.

This study demonstrated a independent association between the number of parities and UI. According to research by Wang et al., multiparity was associated with the presence of UI; this is consistent with reports showing higher odds of gestational UI among women with previous vaginal birth compared with nulliparous women [9]. It has been noted that a history of cesarean delivery does not have a protective or increasing effect on UI. Similarly, previous studies have supported the finding that women who have previously had a vaginal delivery or an assisted vaginal delivery are more prone to UI during pregnancy [16].

On the other hand, there are views that caffeine consumption may increase the risk of UI. However, studies on this subject have produced conflicting results, which are generally due to methodological limitations [1]. It has been suggested that caffeine may trigger contractions in the bladder and thus contribute to incontinence [9]. However, in our study; borderline association was found between caffeine consumption and UI. Future studies with larger sample sizes caffeine intake data may clarify this relationship.

This study makes valuable contributions to the literature in terms of the number of patients and the results achieved. However, it has some limitations. Firstly, since it has a cross-sectional design, it is not possible to establish causal relationships with the identified risk factors. The data were based on the self-reports of the participants and there is a risk of recall bias and underreporting, especially on sensitive issues such as UI. The single-centre nature of the study also limits the generalisability of the findings. However, several aspects strengthen our study. The validated tools such as the ICIQ-SF and UDI-6 were employed. Evaluating incontinence onset by trimester also increased the clinical value of the results. To confirm these findings multicenter, prospective, and longitudinal studies are needed. Future studies should also investigate whether antenatal education programmes on pelvic floor health reduce the incidence or severity of UI during pregnancy. In addition, researchers should assess the effectiveness of early preventive strategies for high-risk groups.

Conclusion

In conclusion, UI is a common but often overlooked problem during pregnancy. It is possible to identify women at risk at an early stage through targeted screening and prenatal counselling. This can improve maternal quality of life and reduce postpartum complications. In addition, pregnant women at risk should be properly informed and managed during the follow-up process.

Conflict of Interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
The authors declare that they have received no financial support for the study.

Ethical Approval
Ethical approval was obtained from Ethics Committee of Ankara Etlik City Hospital (February 28, 2024; Approval No: AEŞH-BADEK-2024-200).

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