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Evaluation of Urinary Incontinence Status of Women With Diabetes: Cross-Sectional Analytical Study

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ABSTRACT

This study aimed to evaluate urinary incontinence and its impact on quality of life in women diagnosed with diabetes. Conducted as a cross-sectional analytical study, it included 217 women with diabetes who were admitted to a public hospital. Data were collected through face-to-face interviews using the Descriptive Information Form and the Incontinence Quality of Life Scale (I-QOL), and statistical analyses were performed using SPSS 25.0. Significant differences were found between I-QOL total and subscale scores and various incontinence-related factors, including pain during urination, amount of urine leakage, presence of incontinence, coping strategies for incontinence, difficulty urinating, urinary tract infections in the last 6 months, incontinence episodes in the last 30 days, incontinence while urinating, frequency of urinary incontinence, frequent urination, use of incontinence-related medication, and pad use ($p < 0.01$). Overall, the findings indicate that urinary incontinence is a prevalent health issue among women with diabetes and significantly impairs their quality of life, suggesting that addressing incontinence within diabetes management programs may help improve patient well-being.

1 | Introduction

Diabetes is a chronic and metabolic disease that occurs due to insufficient insulin production or the inability of insulin to enter cells [1]. This condition leads to uncontrolled increases in blood sugar levels, resulting in various systemic complications and negatively affecting individuals' quality of life Turkish Society of Endocrinology and Metabolism [2]. The prevalence of diabetes is steadily increasing worldwide, posing a significant public health concern [3].

According to the International Diabetes Federation [3], the number of people with diabetes is expected to reach 643 million by 2030 and 783 million by 2045. These projections highlight the urgent need for effective strategies in diabetes prevention and management. Turkey is among the countries in Europe with the highest diabetes prevalence, with an estimated 6.6 million diabetic individuals according to the 2019 IDF Diabetes Atlas. This number is expected to rise to 10 million by 2045, and Turkey is predicted to be among the top 10 countries worldwide with the highest number of people living with diabetes [1].

Diabetes is not only a metabolic disorder but also significantly increases individuals' susceptibility to infections [2]. The incidence of infections is higher in diabetic individuals compared to non-diabetics, with urinary tract infections (UTIs) being one of the most common infection types among diabetic patients [4].

Summary

- What is currently known?
  - Urinary incontinence (UI) is a prevalent complication in women with diabetes mellitus, significantly impairing their quality of life. While previous studies have explored the general prevalence and risk factors of UI, limited research has focused specifically on diabetic women in regional contexts or evaluated the multifactorial predictors of incontinence severity and quality of life in this population.
- What does this article add?
  - This study provides comprehensive evidence on the prevalence and impact of urinary incontinence among diabetic women, emphasising the relationship between UI and factors such as age, education level, chronic illnesses, parity, menopause duration, and BMI. By identifying these predictors, the article highlights the need for integrating incontinence assessment and individualized care strategies into routine diabetes management. It also presents one of the few cross-sectional analytical studies conducted in Turkey on this subject, contributing region-specific insights to the literature.

Additionally, diabetic neuropathy is one of the major complications of diabetes. Diabetic neuropathy can progressively affect the nervous system, impairing the function of neurons and negatively impacting bladder and urethral sphincter nerves, leading to urinary incontinence [5].

Urinary incontinence is a critical health issue that significantly affects the quality of life of diabetic patients [6]. This condition can negatively influence daily activities, psychosocial well-being, and overall health perception [5]. The higher prevalence of urinary incontinence in diabetic individuals underscores the need for further research on prevention and management strategies [4, 6]. This study aims to evaluate the urinary incontinence status of women diagnosed with diabetes. Increasing awareness of urinary incontinence among diabetic individuals and contributing to potential solutions for this issue are among the primary objectives of this study. Within the scope of this study, the following research questions will be addressed:

Q1. What is the prevalence of urinary incontinence among women with diabetes, and how does it affect their quality of life?

Q2. What are the sociodemographic and clinical factors associated with urinary incontinence in diabetic women?

Q3. How do diabetes duration and the presence of chronic illnesses influence urinary incontinence and its impact on quality of life?

Q4. What is the relationship between the severity of urinary incontinence and the use of incontinence management strategies, such as medication and pads?

2 | Method and Material

2.1 | Desing

A cross-sectional analytical study.

2.2 | Sample

The study population consisted of female patients diagnosed with diabetes who applied to a public hospital in southeastern Turkey between May and August 2023. However, since an exact number for the population could not be determined, the Cochran formula was used to calculate the sample size. Based on the assumption of an infinite population, with a 95% confidence level and a 5% margin of error ($d = 0.05$), it was determined that at least 184 participants needed to be included in the study. However, considering the possibility of a finite population, the sample size was adjusted based on volunteers willing to participate in the study. As a result, 217 diabetic women who met the inclusion criteria and agreed to participate were included in the study. This approach was implemented to include as many diabetic women as possible who applied to the hospital, ensuring a comprehensive representation of the target population. The obtained sample aimed to enhance the statistical validity of the study and provide a broader perspective on the research findings. At the end of the study, a post hoc power analysis was conducted to assess whether the sample size was statistically sufficient. Using G*Power 3.1 software, the effect size was set at 0.30, and the significance level ($\alpha = 0.05$) was considered, resulting in a calculated statistical power of 0.82. This result indicates that the sample size was statistically adequate and provided a robust analysis.

2.3 | Data Collection

The data were collected through face-to-face interviews using the "Demographic Information Form" and the "Incontinence Quality of Life Scale (I-QOL)", which were developed by the researchers. To enhance the reliability and validity of the data collection process, all interviews were conducted following a standardized procedure by the researchers. Each interview lasted approximately 13 min, and the questions were presented in a clear and unbiased manner to ensure participants fully understood them. Before the main study, a pilot study was conducted with 20 women to assess the clarity and feasibility of the questionnaires. Based on the feedback obtained from the pilot study, potential ambiguities in the survey were addressed, and the questions were revised for better clarity. However, the data from participants in the pilot study were not included in the final analysis. This approach was designed to enhance the reliability of the research data while ensuring that participants provided accurate and complete responses to the survey questions.

2.4 | Measurment

2.4.1 | Information Form

It is a structured questionnaire consisting of 34 questions designed to assess various aspects of the participants' background and health status. This form includes sections covering sociodemographic characteristics, such as age, marital status, educational level, employment status, and socioeconomic background. Additionally, the form evaluates gynaecological and obstetric history, including menstrual cycle characteristics, number of pregnancies, mode of delivery, history of caesarean section, number of births, menopausal status, and any previous gynaecological conditions or surgeries. Furthermore, the questionnaire explores urinary incontinence status, identifying the presence, frequency, severity, and duration of incontinence symptoms. It also assesses the impact of incontinence on daily life activities, including social interactions, physical activities, emotional well-being, and overall quality of life. This form serves as a comprehensive tool to gather relevant information about participants' health conditions and daily experiences, ensuring a thorough evaluation of the factors contributing to urinary incontinence and its effects on women's quality of life [7–9].

2.4.2 | Incontinence Quality of Life Scale (I-QOL)

The scale was originally developed by Wagner et al. in 1996 to assess the quality of life of individuals experiencing urinary incontinence. The scale was initially designed with 28 questions, but it was later revised in 1999, resulting in a 22-item scale. In 2003, the scale was adapted into Turkish by Özerdoğan and Beji, who conducted a validity and reliability study. The Cronbach's alpha coefficient was found to be 0.96, indicating a high level of internal consistency and reliability. The scale consists of three subdimensions and follows a five-point Likert scale. The subdimensions are: Behavioral Limitation (8 items), Psychosocial Impact (9 items), Social Isolation (5 items). Higher scores on the scale indicate an improved quality of life [10].

2.5 | Data Analysis

The statistical analysis of the study was conducted using the SPSS 25.0 software. Descriptive statistics were used to summarise the data: mean (M) and standard deviation (SD) were reported for continuous (quantitative) variables, whereas frequency (n) and percentage (%) were used for categorical variables. Since the data did not meet the assumptions of normal distribution, non-parametric tests were applied for comparative analyses. Specifically, the Mann–Whitney U test was used for two-group comparisons, while the Kruskal-Wallis H test was used for comparisons involving more than two independent groups. Correlations between variables were assessed using the Spearman-Brown rank-order correlation analysis. For categorical variables, the Chi-square test was applied to determine the relationships between different groups. A significance level of $p < 0.05$ was considered statistically significant for all analyses. These statistical methods were chosen to ensure the robustness and accuracy of the findings, considering the nature of the data distribution.

3 | Ethical Considerations

Ethical approval for the study was obtained from the Ethics Committee (Date: 22.05.2023, Decision No: 2023/50). Before the data collection process commenced, all women who voluntarily agreed to participate in the study were informed in detail about the study's purpose, procedures, and their rights as participants. Written and verbal informed consent was obtained from each participant in accordance with ethical guidelines. Throughout all phases of the study, the principles of scientific research and publication ethics outlined in the Declaration of Helsinki were strictly adhered to. Confidentiality and anonymity of the participants were maintained, and the collected data were used solely for research purposes. Additionally, permission to use the Incontinence Quality of Life Scale (I-QOL) in the study was formally obtained from the original author via email communication. The authors declare that they have no competing interests related to this research.

4 | Results

The study included 217 women, and the examined variables consisted of age group, educational status, employment status, history of chronic illness, severity of incontinence, use of medication for incontinence, and use of incontinence pads. Significant differences were found among age groups in terms of I-QOL total and subscale scores ($p < 0.001$). Post hoc analyses revealed that women aged 39 years and younger had significantly higher I-QOL total and subscale scores compared to those aged 50 years and older. This finding suggests that older women experience the negative impact of incontinence on quality of life more intensely. In terms of education level, women with a high school education or above had significantly higher I-QOL total and subscale scores than illiterate women and those with lower education levels ($p < 0.001$). This finding suggests that higher education levels may reduce the impact of incontinence on quality of life, possibly due to better health literacy and management strategies among these individuals. Analysis based on employment status showed that working women had significantly higher I-QOL total and subscale scores than unemployed women ($p < 0.01$). The ability of employed women to participate more actively in social life and access psychosocial support mechanisms may contribute to mitigating the negative effects of incontinence. Women with a history of chronic illness had significantly lower I-QOL total and subscale scores ($p < 0.001$). This finding suggests that the presence of additional chronic conditions makes managing incontinence more challenging and negatively affects quality of life. Similarly, as the severity of incontinence increased, I-QOL scores in all subscales decreased significantly ($p < 0.001$). Women with mild symptoms had significantly higher quality of life scores than those with moderate to severe incontinence. Women who used medications for incontinence had significantly lower I-QOL total and subscale scores compared to those who did not use medication ($p < 0.001$). This result suggests that as symptoms become more severe, the use of

medication increases, leading to a greater impact on quality of life. Likewise, women who used incontinence pads had significantly lower I-QOL total and subscale scores than those who did not use pads ($p < 0.001$). This suggests that pad usage is typically associated with more severe incontinence cases, which may contribute to a lower quality of life (Table 1).

A moderate negative correlation was found between age and I-QOL total and subscale scores ($p < 0.001$), indicating that as age increases, the negative impact of incontinence on quality of life becomes more pronounced. Similarly, a moderate negative correlation was found between the duration of diabetes diagnosis and I-QOL scores ($p < 0.001$). This result suggests that as the duration of diabetes increases, the impact of incontinence on quality of life becomes more significant. A weak positive correlation was found between age at first pregnancy and I-QOL total and subscale scores ($p < 0.05$). A higher age at first pregnancy may reduce exposure to birth trauma, leading to less severe incontinence and, consequently, better quality of life. On the other hand, the total number of pregnancies, number of spontaneous miscarriages, and number of live births were all significantly negatively correlated with I-QOL scores ($p < 0.001$). Specifically, as the number of pregnancies increased, the negative impact of incontinence on quality of life also increased. This finding can be explained by the pressure that pregnancy and childbirth exert on pelvic floor muscles. A moderate negative correlation was found between the duration of menopause and I-QOL total and subscale scores ($p < 0.001$). As the duration of menopause increases, declining oestrogen levels may contribute to pelvic muscle weakening, exacerbating the effects of incontinence. Similarly, body mass index (BMI) and I-QOL total and subscale scores showed a weak negative correlation ($p < 0.05$). This finding suggests that higher BMI may increase the severity of incontinence and reduce quality of life. Regarding urinary frequency, both daytime and nighttime urination frequency were significantly negatively correlated with I-QOL total and subscale scores ($p < 0.001$). The negative correlation between daytime urination frequency and I-QOL scores was particularly strong ($= -0.494$), indicating that frequent urination is one of the most prominent factors negatively affecting quality of life. A strong negative correlation was found between the duration of incontinence and I-QOL total and subscale scores ($p < 0.001$). The values ranged between -0.7 and -0.74, demonstrating that a longer duration of incontinence has a substantial negative impact on quality of life. This finding suggests that as incontinence persists, individuals face greater challenges in coping with symptoms, leading to a significant reduction in quality of life (Table 2).

According to the logistic regression analysis results, the presence of chronic illness increased the likelihood of incontinence by 3.22 times (OR = 3.224, $p = 0.002$). This finding suggests that chronic diseases may negatively impact bladder function, making incontinence more likely. Similarly, individuals experiencing pain while urinating were found to have a 2.73 times higher risk of developing incontinence (OR = 2.736, $p = 0.043$). This suggests that urinary tract irritation or infections may contribute to the development of incontinence. A history of gynaecological surgery was another significant predictor of incontinence (OR = 5.94, $p = 0.010$). Individuals with a history of pelvic surgeries may have a higher likelihood of impaired bladder and urethral sphincter function, leading to an increased risk of incontinence. Regarding obstetric variables, an increase in the total number of pregnancies was found to raise the risk of incontinence by 1.27 times (OR = 1.271, $p = 0.003$). This result supports the idea that higher parity may contribute to pelvic floor and bladder dysfunction, increasing the risk of incontinence. Increased childbirth numbers may lead to pelvic muscle weakening, reducing the functional capacity of bladder control mechanisms and resulting in incontinence. Another important determinant of incontinence was daily urinary frequency. Each additional unit increase in daily urination frequency was found to increase the likelihood of incontinence by 1.48 times (OR = 1.482, $p < 0.001$). This finding suggests that conditions such as overactive bladder syndrome may be related to incontinence and that increased daily urination frequency is a key indicator of incontinence development. The logistic regression model demonstrated that the independent variables included in the analysis were statistically significant and that the model had a strong explanatory power in predicting the presence of incontinence. The intercept coefficient of the model was found to be statistically significant ($p = 0.025$), indicating that the model was overall statistically appropriate and that the examined variables had a meaningful impact on incontinence presence. In conclusion, logistic regression analysis identified chronic illness, painful urination, a history of gynaecological surgery, total number of pregnancies, and daily urinary frequency as significant predictors of incontinence in women with diabetes. These findings emphasize the importance of early intervention in managing incontinence risk factors and provide valuable data for developing clinical approaches to predicting and managing incontinence (Table 3).

5 | Discussion

In diabetic women, advancing age has been found to negatively affect quality of life in terms of behavioral limitations, psychosocial impact, and social isolation related to urinary incontinence. This finding is consistent with the study by Yılmaz et al. which reported that women aged 55 years and older had lower quality of life scores [9]. Similarly, Kulaksızoğlu found that women in the 43–49 age group had significantly lower scores compared to those in the 15–21 age group [11]. However, Erkal reported no significant differences in I-QOL total and subscale scores among different age groups of diabetic women [7]. These discrepancies may be attributed to differences in sample characteristics and methodological approaches across studies. Additionally, the literature indicates that the severity of lower urinary tract symptoms (LUTS) in diabetic women is associated with a decline in sexual quality of life and that these symptoms are linked to both age and duration of diabetes.

In this study, it was determined that the mean ranks of all subdimensions and the total I-QOL scores were higher among diabetic women with a high school education or above compared to illiterate and literate women. Additionally, in the Psychosocial Impact and Social Isolation subdimensions, as well as the total I-QOL score, diabetic women with primary and secondary school education had higher mean ranks than literate women. These findings suggest that diabetic women with lower education levels experience lower quality of life in terms of behavioral limitations, psychosocial impact, and

TABLE 1 | Comparison of I-QOL and subscale scores by characteristics of diabetic women ($n = 217$).

Characteristics	*n*	Behavioral		Psychosocial		Social isolation		I-QOL total score	
		Mean rank	Medyan (IQR)	Mean rank	Medyan (IQR)	Mean rank	Medyan (IQR)	Mean rank	Medyan (IQR)
Age									
< 39 year[a]	15	165.67	40 (40–37.5)	165.50	44 (45–38.5)	165.63	25 (25–23)	165.33	107 (110–100.5)
40–49 year[b]	45	124.93	32 (40–20)	125.24	37 (44–24)	124.17	21 (25–10)	124.56	90 (108–53)
50–59 year[c]	82	111.88	25 (39–19)	107.95	28 (41.75–23)	109.74	14 (25–10)	110.04	66 (106–51.75)
60–69 year[d]	60	87.18	21 (36.25–16)	89.66	26 (36–21.75)	85.69	12 (22–8)	87.94	60.5 (95–45.75)
> 70 year[e]	15	76.07	21 (24.5–16)	86.87	26 (32.5–20.5)	96.03	13 (16.5–11)	84.03	59 (73.5–45)
Test (χ^2); *p*; post hoc		**27.055 < 0.001** 1 > 3-4-5; 2 > 4		**22.920 < 0.001** 1 > 3-4-5; 2 > 4		**24.281 < 0.001** 1 > 3-4-5; 2 > 4		**24.354 < 0.001** 1 > 3-4-5; 2 > 4	
Education status									
Illiterate[a]	89	97.53	22 (35–17)	97.54	26 (34–22)	98.92	13 (21–9)	97.66	63 (88–49)
Literate[b]	35	87.39	21 (26.5–18)	83.31	24 (29.5–22)	78.31	10 (15.5–8)	82.94	58 (72–48)
Primary and secondary school[c]	65	119.54	32 (40–18)	121.91	32 (45–24)	122.09	19 (25–11)	122.01	81 (110–53)
High school and above[d]	28	148.02	39 (40–28.75)	147.57	43 (45–31)	149.02	25 (25–18.5)	147.41	107 (110–78.25)
Test (χ^2) *p* post hoc		**20.057 < 0.001** 4 > 1-2		**22.313 < 0.001**4 > 1-2; 3 > 2		**25.412 < 0.001** 4 > 1–2; 3 > 2		**22.343 < 0.001** 4 > 1-2; 3 > 2	
Employment status									
Unemployed	204	105.97	24 (38.25–18)	105.79	28 (40.25–22)	106.11	14 (24.25–9)	105.91	65.5 (102–50)
Employed	13	156.54	40 (40–32)	159.31	44 (45–43)	154.35	25 (25–22)	157.50	109 (110–97)
Test (*Z*) *p*		**2.836 0.005**		**2.991 0.003**		2.716 0.007		**2.882 0.004**	
Having a chronic illness									
Yes	125	89.66	21 (29–17)	89.18	26 (31–21)	89.21	12 (18–9)	89.35	61 (76–46)

(Continues)

TABLE 1 | (Continued)

Characteristics	*n*	Behavioral		Psychosocial		Social isolation		I-QOL total score	
		Mean rank	Medyan (IQR)	Mean rank	Medyan (IQR)	Mean rank	Medyan (IQR)	Mean rank	Medyan (IQR)
No	92	135.28	37.5 (40–21)	135.93	38.5 (45–26.75)	135.89	22 (25–12.75)	135.70	98.5 (110–59.75)
Test (*Z*); *p*		5.329 **<0.001**		5.443 **<0.001**		5.473 **<0.001**		5.391 **<0.001**	
Discomfort due to incontinence									
None[a]	64	181.97	40 (40–40)	180.96	45 (45–43)	180.95	25 (25–25)	181.55	110 (110–107)
Mild[b]	21	129.69	30 (36–25)	126.74	31 (37–29)	125.81	18 (22–14)	129.14	75 (96–68)
Moderate[c]	78	88.63	22 (26–19)	89.43	26 (30–23)	87.88	13 (15–10)	89.40	60.5 (71.75–53)
Severe[d]	54	43.90	16 (18.75–12.25)	45.08	19.5 (23.5–17)	47.69	8 (11–7)	43.48	44 (51.5–37)
Test (χ^2); *p*; post hoc		**157.289 <0.001** 1 > 2-3-4; 2 > 3-4; 3 > 4		**150.471 <0.001** 1 > 2-3-4; 2 > 4; 3 > 4		**149.137 <0.001** 1 > 2-3-4; 2 > 4; 3 > 4		**155.025 <0.001** 1 > 2-3-4; 2 > 4; 3 > 4	
Use of medication for incontinence									
Yes	27	52.30	17 (20–14)	57.44	22 (26.5–17)	55.02	9 (11–7.5)	54.07	47 (57–39)
No	190	117.06	26.5 (40–19)	116.33	31 (43.75–24)	116.67	16 (25–11)	116.81	73.5 (107–53.25)
Test (*Z*); *p*		**5.052 <0.001**		**4.578 <0.001**		**4.827 <0.001**		**4.874 <0.001**	
Use of pads for incontinence									
Yes	88	67.93	19 (24–16)	70.55	23.5 (28–20)	72.02	11 (14–8)	69.25	53 (64.25–44.75)
No	129	137.02	37 (40–23)	135.23	37 (45–26)	134.22	22 (25–12)	136.12	98 (110–61)
Test (*Z*); *p*		**8.017 <0.001**		**7.481 <0.001**		**7.245 <0.001**		**7.728 <0.001**	

Note: Bold values indicate statistically significant results ($p < 0.05$ or $p < 0.01$).
Abbreviations: I-QOL, incontinence quality of life scale; IQR, interquartile range; Q1, first quartile (25th percentile); Q3, third quartile (75th percentile).
[a]Post hoc (Bonferroni method).
[b]Representation of differences between groups.
[c]Mean rank: Rank mean.
[d]$\chi 2$: Kruskal-Wallis H test.
[e]Z: Mann–Whitney U test.

TABLE 2 | Relationship between selected characteristics of diabetic women and I-QOL total and subscale scores.

Characteristics	Behavioral		Psychosocial		Social isolation		I-QOL total score	
	r_s	p	r_s	p	r_s	p	r_s	p
Age (year)	−0.346	**<0.001**	−0.308	**<0.001**	−0.308	**<0.001**	−0.321	**<0.001**
Age at first pregnancy (years)	0.158	**0.020**	0.181	**0.008**	0.191	**0.005**	0.179	**0.008**
Total number of pregnancies	−0.256	**<0.001**	−0.257	**<0.001**	−0.276	**<0.001**	−0.263	**<0.001**
Number of spontaneous miscarriages	−0.157	**0.020**	−0.133	**0.049**	−0.179	**0.008**	−0.153	**0.024**
Number of induced abortions	−0.066	0.335	−0.071	0.296	−0.084	0.220	−0.077	0.261
Number of stillbirths	−0.013	0.844	−0.041	0.549	−0.031	0.651	−0.026	0.707
Number of live births	−0.258	**<0.001**	−0.245	**<0.001**	−0.259	**<0.001**	−0.252	**<0.001**
Duration since menopause (years)	−0.236	**<0.001**	−0.239	**<0.001**	−0.215	**0.001**	−0.240	**<0.001**
BMI (kg/m^2)	−0.135	**0.047**	−0.122	0.073	−0.157	**0.021**	−0.139	**0.040**
Duration since diabetes diagnosis (years)	−0.318	**<0.001**	−0.304	**<0.001**	−0.286	**<0.001**	−0.303	**<0.001**
Daily urination frequency (times per day)	−0.494	**<0.001**	−0.513	**<0.001**	−0.542	**<0.001**	−0.518	**<0.001**
Nocturnal urination frequency (times per night)	−0.377	**<0.001**	−0.385	**<0.001**	−0.376	**<0.001**	−0.382	**<0.001**
Duration of incontinence (years)	−0.744	**<0.001**	−0.711	**<0.001**	−0.714	**<0.001**	−0.732	**<0.001**

Note: r_s: Spearman-Brown Rank-Order Correlation Coefficient, $r = 0.1$— < 0.3 indicates a weak correlation, $r = 0.3$— < 0.7 indicates a moderate correlation, $r = 0.7$— < 1.0 indicates a high correlation. Bold values indicate statistically significant results ($p < 0.05$ or $p < 0.01$).
Abbreviations: BMI, body mass index; I-QOL, incontinence quality of life scale.

social isolation due to urinary incontinence. At the same time, a statistically significant difference was found between education levels in total scale scores and subdimension scores of behavioral limitations, psychosocial impact, and social isolation. It was observed that primary school graduates had higher mean scores than postgraduate graduates, suggesting that a higher education level may contribute to improving quality of life. This finding is consistent with the study conducted by Aylaz et al. which reported that individuals with higher education levels had higher quality of life scores [12]. Similarly, more recent studies conducted after 2018 have also shown that higher education levels may mitigate the negative impact of urinary incontinence on the quality of life of diabetic women. For example, in the study by Kumsar et al. it was noted that women with higher education levels were better able to manage urinary symptoms and had a higher quality of life [13].

This study identified that the mean ranks of all subdimensions and the total I-QOL scores were higher among working diabetic women compared to non-working diabetic women. This finding suggests that non-working diabetic women experience lower quality of life in terms of behavioral limitations, psychosocial impact, and social isolation due to urinary incontinence. However, in the study conducted by Erkal, no significant difference was found in Quality of Life Scale scores and subdimensions between working and non-working diabetic women [7]. Similarly, in the study by Kumsar et al. it was reported that as the severity of lower urinary tract symptoms (LUTS) increased in diabetic women, their sexual quality of life decreased, and these symptoms were associated with age and duration of diabetes [13].

It was determined that the mean ranks of all subdimensions and the total Incontinence Quality of Life Scale (I-QOL) scores were higher among diabetic women without a history of additional chronic illnesses compared to those with such a history. This finding suggests that diabetic women with additional chronic diseases experience lower quality of life in terms of behavioral limitations, psychosocial impact, and social isolation due to incontinence. In contrast, Erkal found no statistically significant difference in I-QOL total and subdimension scores between diabetic women with and without chronic illnesses. However, more recent studies indicate that chronic conditions significantly impact urinary incontinence and overall quality of life [7]. For example, Kumsar et al. reported that as the severity of lower urinary tract symptoms (LUTS) increased among diabetic women, their sexual quality of life significantly decreased, and these symptoms were associated with age and duration of the disease [13]. Similarly, research on obese women has shown that urinary incontinence negatively affects quality of life and increases depression levels [14]. Additionally, Altunkol et al. found that urinary incontinence significantly impacts women's emotional well-being and quality of life, with many patients unaware of the potential benefits of exercise-based treatment for incontinence management [8]. These findings collectively indicate that the presence of additional chronic illnesses, the severity of LUTS, and obesity contribute to the decline in quality of life among diabetic women, reinforcing the need for comprehensive management strategies for urinary incontinence.

It was observed that, chronic illness status, pain during urination, history of gynaecological surgery, total number of

TABLE 3 | Factors influencing the presence of incontinence according to I-QOL: logistic regression analysis.

Variables included in the model	*B*	S.H.	Wald	Sd	*p*	OR	95% confidence intervals for OR	
							LB	UB
Chronic disease status (1)	1.170	0.370	10.024	1	**0.002**	3.224	1.562	6.653
Pain during urination (1)	1.006	0.497	4.098	1	**0.043**	2.736	1.032	7.250
Gynaecology surgery history (1)	1.782	0.687	6.721	1	**0.010**	5.944	1.545	22.869
Total number of pregnancies	0.240	0.080	8.904	1	**0.003**	1.271	1.086	1.488
Daily urination frequency	0.394	0.092	18.183	1	**<0.001**	1.482	1.237	1.776
Constant	−1.726	0.770	5.025	1	**0.025**	0.178		

Note: For the presence of incontinence variable, a combination was made for suitability in logistic regression analysis, with (0) none/absent and (1) present as assigned categories. Bold values indicate statistically significant results ($p < 0.05$ or $p < 0.01$).
Abbreviations: df, degrees of freedom; LB, lower bound; OR, odds ratio; SE, standard error; UB, upper bound.

pregnancies, and daily urination frequency are significant factors influencing the occurrence of urinary incontinence. For each unit increase, the likelihood of incontinence increases as follows: chronic illness status (OR = 3.224), pain during urination (OR = 2.736), history of gynaecological surgery (OR = 5.944), total number of pregnancies (OR = 1.271), and daily urination frequency (OR = 1.482) (Table 3). In a similar study, Khadour et al. found that the prevalence of urinary incontinence is higher in women with type 2 diabetes and identified associated risk factors [15]. Additionally, Jeanette et al. reported that diabetic women experience more severe and symptomatic urinary incontinence compared to non-diabetic women [16]. Diuretic medications, commonly used in the treatment of cardiovascular diseases and other chronic conditions, increase urine output, leading to more frequent urination. This persistent increase in bladder volume may cause ligament stretching and loss of elasticity over time, ultimately resulting in incontinence. Similarly, a higher number of childbirths is also considered a contributing factor, as repeated pregnancies can weaken pelvic floor muscles and increase pressure on the bladder, leading to urinary dysfunction. These findings emphasize the importance of considering these risk factors in the prevention and management of urinary incontinence, particularly among diabetic women.

6 | Limitations

Despite its valuable contributions, this study has certain limitations. The cross-sectional design prevents the establishment of causal relationships between urinary incontinence and the identified risk factors, highlighting the need for longitudinal studies to confirm these associations. Additionally, the study was conducted in a single public hospital in southeastern Turkey, which may limit the generalizability of the findings to different populations and healthcare settings. A larger, multicenter study could provide a broader understanding of the issue. Another limitation is the reliance on self-reported data, which may introduce recall bias or social desirability bias. Incorporating objective clinical assessments, such as urodynamic tests, in future research could enhance the accuracy of the findings. Although several important variables were examined, additional factors such as dietary habits, physical activity levels, medication adherence, and other comorbid conditions were not comprehensively analyzed. A more holistic approach in future studies could help better understand the complex nature of urinary incontinence in diabetic women. Furthermore, the study did not extensively explore cultural and psychosocial factors, such as stigma associated with incontinence and differences in healthcare-seeking behaviors. Investigating these sociocultural influences could provide further insights into the challenges faced by women with diabetes-related incontinence and contribute to more effective, culturally sensitive healthcare interventions.

7 | Conclusion

The findings of this study demonstrate that urinary incontinence is a significant health issue among women with diabetes, negatively impacting their quality of life in various dimensions, including behavioral limitations, psychosocial effects, and social isolation. The results revealed that age, duration of diabetes, the presence of chronic illnesses, the number of pregnancies, and the frequency of urination are key factors influencing the severity and impact of incontinence. Additionally, women with higher education levels and those who are employed were found to have higher I-QOL scores, suggesting that factors such as health literacy, access to healthcare services, and social participation play a crucial role in mitigating the negative effects of incontinence. Conversely, women with chronic illnesses, higher BMI, and a longer duration of diabetes experienced lower quality of life scores, indicating the need for targeted interventions to manage incontinence symptoms and improve overall well-being. Given the expected increase in diabetes prevalence in the coming years, the management of incontinence should be integrated into diabetes care programs. Healthcare providers should focus on raising awareness, promoting preventive strategies, and offering treatment options tailored to the needs of diabetic women. Future research should explore longitudinal data and intervention-based studies to develop more effective management strategies for urinary incontinence in this population.

8 | Implications for Practice

The findings of this study highlight the need for an integrated approach to urinary incontinence management in diabetic women, emphasizing the importance of early screening, patient education, and multidisciplinary care strategies. Given the significant impact of incontinence on quality of life, healthcare providers should incorporate routine urinary incontinence assessments into diabetes management protocols to ensure early identification and timely intervention. Addressing modifiable risk factors such as obesity, physical inactivity, and medication adherence could help reduce the severity of incontinence symptoms, whereas patient-centered interventions, including pelvic floor muscle training, lifestyle modifications, and behavioral therapy, should be promoted as part of diabetes care. The study also underscores the role of health literacy and socioeconomic factors, suggesting that targeted educational programs and support systems should be developed to empower women in managing their symptoms effectively. Healthcare professionals should adopt a more proactive and holistic approach, integrating incontinence management into routine diabetes care and offering individualized treatment plans based on patient-specific needs. Future clinical guidelines should emphasize interdisciplinary collaboration between endocrinologists, gynecologists, urologists, and physiotherapists to enhance the overall health outcomes of women with diabetes-related incontinence. Additionally, raising public awareness about the condition and reducing stigma associated with urinary incontinence could improve healthcare-seeking behaviors and ensure that more women receive the appropriate medical support and intervention.

Author Contributions

Idea/concept: İ.A.K., İ.A.E. Design: İ.A.K., İ.A.E., N.O., E.D. Supervision/consultancy: İ.A.K., N.O. Analysis and/or interpretation: İ.A.K., İ.A.E., N.O., E.D. Literature search: İ.A.K., N.O. Writing of the manuscript: İ.A.K., İ.A.E., N.O. E.D. Critical review: İ.A.K., İ.A.E., N.O., E.D.

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Ethics Statement

Prior to initiating the study procedures, approval was obtained from the non-interventional research ethics committee of Hasan Kalyoncu University (Date: 22.05.2023, Number of Decisions: 2023/50). Permission was also granted by the health institution where the research was conducted. Patient confidentiality was prioritized within the scope of the study. Oral and written consent was obtained from patients, and they were assured that the information collected would be used solely for research purposes. The principles of the Helsinki Declaration were followed during the entire process. Permission to use the scales, whose validity and reliability were previously established by their authors, was obtained via email.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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