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Prevalence and risk factors of urinary incontinence among Iranian women

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Abstract

Background: Urinary incontinence is a common condition among women. Although it is not a life-threatening condition, it dramatically influences the quality of life. This study aimed to estimate the prevalence of urinary incontinence and its risk factors among Iranian women in Kerman, Iran.

Methods: This cross-sectional, population-based study was conducted on 3100 Iranian women aged 15–80 years in 2017 in Kerman, Iran. The participants were selected via cluster sampling and were invited to complete the questionnaires. Their demographic information and medical history were assessed, the urinary incontinence questionnaire was completed, and the associated risk factors were also recorded. Quantitative variables are reported as mean ± *SD*, while qualitative and ranked variables are expressed in percentage. All analyses were conducted in Stata version 12 (Stata Corp.).

Results: The mean age of the participants was 46 years, and the overall prevalence of urinary incontinence was estimated to be 63%. The highest and lowest prevalence rates of urinary incontinence were reported in the elderly and the youth, respectively (79% and 41%, respectively). Age, increase of body mass index (BMI), pregnancy, diabetes, anxiety, and depression were the associated risk factors.

Conclusion: We found that the prevalence of urinary incontinence is high in Iran. Therefore, to control this condition and improve women's quality of life, effective plans are needed.

KEYWORDS

Iranian women, prevalence, risk factors, urinary incontinence

1 | INTRODUCTION

According to the International Continence Society, urinary incontinence is defined as the complaint of the involuntary loss of urine.[1] This common condition often causes disorders in the individual's social, physical, and mental welfare. Negative psychological effects of urinary incontinence include anxiety, depression, and lack of self-confidence. In addition, physical complications of urinary incontinence are associated with an unpleasant body odor, urinary tract infections, skin allergy, and sleep disorders.[2,3] Furthermore, fall or bone fracture may occur in some cases, especially in the elderly due to the urgency of urination.[4]

Urinary incontinence results in embarrassment, frustration, and social isolation and limits women's social activities.[5,6] Furthermore, it imposes a significant economic burden on health systems in many countries.[7–9] For Muslim women, urinary incontinence is a more serious problem, as they say, prayers five times a day, and during prayers, their body, clothes, and place of prayers must be clean. Saying prayers requires concentration and wholeheartedness, and urinary incontinence prevents women from achieving these states.[10,11]

According to epidemiological studies, more than 40% of women throughout the world suffer from urinary incontinence.[7] However, based on the definitions and diagnostic methods, different prevalence rates have been reported in different studies, ranging from 15% to 69%, depending on the study population and its characteristics.[12] Moreover, the prevalence of this condition varies depending on age. According to statistics, the prevalence of urinary incontinence varies from 10% to 40% among middle-aged women and is estimated to be 69% in the elderly.[7,8,13]

Numerous risk factors contribute to urinary incontinence, including age, race, obesity, smoking, chronic diseases (e.g., diabetes and constipation), and obstetric factors, such as the number of pregnancies and deliveries, mode of delivery, hormonal status, and/or gynecological surgeries (e.g., hysterectomy).[14] Similar to other developing countries, life expectancy has increased in Iran. Therefore, chronic diseases, such as urinary incontinence, have become more prevalent. On the other hand, due to the embarrassment associated with this condition, patients are less likely to discuss it with healthcare providers in the healthcare system. Therefore, the reported prevalence rate is below the actual level.

According to local reports from Iran, 31.8% of women between 15 and 49 years old suffer from stress urinary incontinence, 25.5% from urgency urinary incontinence, and 19.4% from mixed urinary incontinence.[15] Most studies in Iran have been conducted on selected populations, such as patients referred to urogynecology clinics. However, in a study on a random population in Tehran, Iran, the prevalence of urinary incontinence in women aged 40–49, 50–59, 60–69, and >70 years was 38.8%, 40.9%, 34.5%, and 37%, respectively.[16]

Altogether, the number of studies on women's urinary incontinence in random populations is quite limited in Iran. This study aimed to provide a population-based report of the prevalence and risk factors of urinary incontinence in Iranian women in Kerman. It seems that the present study, which was conducted on a random population in Kerman, can provide an accurate estimate of the prevalence of urinary incontinence in this city.

2 | METHODS

The present study is a population-based, cross-sectional study conducted in 2017. The study population included 3100 women who were 15–80 years of age and had been living in Kerman for at least 5 years. This study was also approved by the Research Ethics Committee of Kerman University of Medical Sciences. The participants were selected using cluster sampling according to the postal code of four districts in Kerman. They were invited via phone calls or invitation letters to complete the questionnaires and participate in the study. Those who were willing to participate were included in the study.

In this study, a general practitioner completed a history for each participant, including demographic information, medical history of diabetes and hypertension, patient's family history, medication use, and other risk factors, such as smoking. Questionnaires regarding physical activity, nutrition, tobacco consumption, and psychiatric conditions were also completed. Furthermore, the urinary incontinence questionnaire was completed for each participant.

Beck Anxiety Inventory and Beck Depression Inventory were used to study the participants' anxiety and depression. The scores for different stages of depression were graded as follows: 0–15 (asymptomatic), 16–30 (mild symptoms), 31–46 (moderate symptoms), and 47–63 (clinical depression). Score ranges for different stages of anxiety were 0–7 (normal), 8–15 (mild), 16–25 (moderate), and 26–63 (severe).[17,18]

Moreover, the questionnaires used for urinary incontinence included urogenital distress inventory (UDI-6), which included questions about urinary incontinence, its type, and its effect on the individual's daily life. According to the International Continence Society, there are various types of UI, such as stress urinary incontinence, urgency urinary incontinence, mixed urinary incontinence and etc.[1] We assigned one of the subtypes of UI to each participant reporting positive symptoms based on her answers in the UDI-6 questionnaire.

The participants' height and weight were also measured and recorded. Quantitative variables are reported as mean $\pm$ *SD*, while qualitative and ranked variables are expressed in percentage. All analyses were conducted in Stata version 12 (Stata Corp.). The prevalence of urinary incontinence was reported based on absolute and relative abundance at a confidence interval of 95% (95% CI). Univariate and multivariate logistic regression analyses were also used to predict factors affecting urinary incontinence. Moreover, only

the variables with $p < .1$ in the univariate analysis were added to the final multivariate models, crude and adjusted odds ratios (AORs) were measured to demonstrate the significance of associations. A $p < .05$ was considered statistically significant.

3 | RESULTS

To analyze the data and estimate the prevalence of urinary incontinence in Kerman, data of 3100 women, with a mean age of 46 ± 15 years, were included in the study. Regarding the demographic characteristics, the majority of women were married (78%). Overall, 74% of the subjects were housewives, while others had governmental or nongovernmental jobs or were retired. In terms of education, most of the subjects had a high-school diploma (the age of diploma in Iran is 18 years old; 35%).

Regarding the urogenital distress inventory questionnaire (UDI-6), the mean score was 8.07 ± 1.8 years and the prevalence of urinary incontinence was estimated to be 63% in the study population. Regarding age, the highest and lowest prevalence rates of urinary incontinence were reported in the elderly and the youth, respectively (79% and 41%, respectively). Therefore, among subjects in the age range of 0–39 years, only 41% were suffering from urinary incontinence, while in individuals aged above 60 years, the prevalence rate was approximately 79%.

In terms of education, urinary incontinence was more prevalent among the illiterate (79%). On the other hand, approximately 45% of individuals with a bachelor's degree or higher were suffering from urinary incontinence. In terms of marital status, 78% of widows were suffering from urinary incontinence, while among singles, the prevalence of urinary incontinence was low (32%). Furthermore, regarding occupational status, the highest and lowest prevalence rates were reported in the retired and the governmental clerks, respectively (69% and 45%, respectively). Table 1 presents the rest of the collected data.

Different types of urinary incontinence are presented in Table 2. In participants aged below 40 years, the prevalence of stress (19.1%) and urgency (19.6%) incontinence was approximately the same, followed by mixed incontinence (14.4%). In participants aged 40–60 years of age, the prevalence of stress, mixed, and urgency incontinence was 56.5%, 55%, and 51.1%, respectively. Furthermore, in individuals above 60 years of age, the prevalence of mixed, urgency, and stress incontinence was 30.5%, 29.1%, and 24.4%, respectively. In most cases, the severity of urine leakage was mild. The rest of the results are presented in Table 2.

TABLE 1 Urinary incontinence prevalence based on demographic variables, community-based study (KERCADRS-2nd round $n = 3100$), Kerman, Iran, 2017

Variable	Prevalence (%)	Confidence interval 95%	
Age (range)			
0–39	42	39	45
40–60	71	69	74
>60	79	76	82
Education			
No education	79	74	83
Primary	74	70	77
Guidance	59	55	63
Diploma	60	57	63
Associate's degree	55	48	63
Bachelor	46	43	51
Marital status			
Single	32	28	37
Married	65	64	67
Divorced	60	45	74
Widowed	79	74	83
Occupation			
Governmental	45	39	51
Non-governmental	55	47	62
Student	53	46	59
Retired	69	62	75
Housework	65	63	67
Smoking			
No	62	61	64
Yes	68	47	83
HRT			
No	74	72	76
Yes	56	36	74
Depression			
No	62	60	64
Yes	88	79	94
Anxiety			
No	61	59	62
Yes	85	80	89
Diabetes			
No	60	58	62
Yes	79	75	82
BMI			
Normal	54	51	57
Overweight and obese	66	64	68
Total	63	61	64

Abbreviations: BMI, body mass index; CI, confidence interval; HRT, hormone replacement therapy; KERCADRS, Kerman coronary artery disease risk factor study.

TABLE 2 Urinary incontinence prevalence based on age and severity, community-based study (KERCADRS-2nd round, $n = 3100$), Kerman, Iran, 2017

UDI type	Age group	low	Moderate	Severe	Total
Urgency	0–39	223 (20.53)	17 (13.49)	1 (8.33)	241 (19.69)
	40–60	566 (52.12)	54 (42.86)	6 (50)	626 (51.14)
	>60	297 (27.35)	55 (43.65)	5 (41.67)	357 (29.17)
Stress	0–39	246 (19.84)	11 (11.0)	2 (20.0)	259 (19.19)
	40–60	703 (56.59)	57 (57.0)	4 (40.0)	764 (56.59)
	>60	291 (23.47)	32 (32.0)	4 (40.0)	327 (24.42)
Mixed	0–39	105 (14.98)	11 (11.11)	2 (10.53)	118 (14.41)
	40–60	395 (56.35)	48 (48.48)	8 (42.11)	451 (55.07)
	>60	201 (28.67)	40 (40.40)	9 (47.37)	250 (30.53)

Abbreviations: KERCADRS, Kerman coronary artery disease risk factor study; UDI, urogenital distress inventory.

Table 3 presents the ratio of urinary incontinence prevalence for the confounding and main variables in univariate and adjusted analyses. According to the findings of univariate analysis, a higher level of education leads to a decrease in the odds of having the condition. In other words, the odds of having the condition in individuals with a bachelor's degree was more than 75% lower than that of the illiterate (OR = 0.25; 95% CI = 0.40–0.51). Although the results of multivariate regression analysis indicated a decrease in the risk, the relationship was not significant (OR = 0.93; 95% CI = 0.61–1.04).

Moreover, the results of the multivariate analysis indicated that anxiety may increase the odds of having urinary incontinence (AOR = 2.93; 95% CI = 1.48–5.79). The present results showed that depression could also be a relevant factor (AOR = 2.96; 95% CI = 0.85–10.23). As presented in the table, the odds ratio of having urinary incontinence in overweight people was significantly higher than that of people with a normal body mass index (BMI), based on the multivariate analysis (AOR = 1.59; 95% CI = 1.17–2.16). Moreover, the univariate analysis showed that menopause almost doubled the odds of having the condition (OR = 2.62, $p < .001$). However, in the multivariate analysis, this relationship was not significant (AOR = 0.82; 95% CI = 0.61–1.09).

Furthermore, the adjusted analysis indicated that with each year increase in age, the odds of having the condition also increased significantly by approximately 4% (AOR = 1.04; 95% CI = 1.03–1.05). In this study, the odds of having the condition in individuals with a history of pregnancy was 49% higher than those who did not (AOR = 1.49; 95% CI = 1.13–1.96). According to the results presented in the table, occupational status did not have a significant relationship with the odds of having the condition based on the adjusted analysis. On the other hand, diabetes increased the adjusted risk of having the condition more than 1.5 times (AOR = 1.51; 95% CI = 1.14–2.02) although the univariate analysis indicated that physical activity decreased the odds of having the condition by approximately 55% (OR = 0.45; $p < .001$), this reduction was not significant in the multivariate analysis (AOR = 0.75; 95% CI = 0.53–1.06).

Based on the findings, although hysterectomy increased the odds of having the condition by 90%, no significant relationship was found (AOR = 0.90; 95% CI = 0.61–1.34). Moreover, the multivariate analysis showed a 20% increase in the odds of having the condition among smokers, but this relationship was not statistically significant (AOR = 1.22; 95% CI = 0.46–3.23). The univariate analysis showed that a history of hormone consumption decreased the odds of having the condition by 45%. However, this relationship was not significant, according to the AOR (AOR = 0.52; 95% CI = 0.21–1.29). In this study marital status was not associated with the condition.

Other related data are presented in Table 3.

4 | DISCUSSION AND CONCLUSION

In this population-based study, we investigated the prevalence of urinary incontinence and contextual risk factors among 3100 Iranian women residing in Kerman, Iran. Kerman is a city located in the southeast of Iran and is the capital of Kerman Province (the second largest province of Iran). It has an economically and culturally heterogeneous population structure and is a good sample of Iran's population structure.

In the present study, the studied age group was 15–80 years, with a mean age of 46 years. Based on the

TABLE 3 Crude and adjusted odds ratio for different predictors of urinary incontinence, community-based study (KERCADRS-2nd round, $n = 3100$), Kerman, Iran, 2014–2017[a]

Variable	Unadjusted odds ratio	*p*	Adjusted odds ratio (95% CI)
Anxiety			
No	Reference	Reference	Reference
Yes	3.82	.00	2.93 (1.48–5.79)
Depression			
No	Reference	Reference	Reference
Yes	4.76	.00	2.96 (0.85–10.23)
Education			
No education	Reference		
Elementary education	0.54	.00	1.05 (0.75–1.48)
Diploma	0.38	.00	1.2 (0.83–1.74)
Higher education	0.25	.00	0.93 (0.61–1.42)
BMI			
Normal	Reference	Reference	Reference
Overweight and obese	1.65	.00	1.59 (1.17–2.16)
Menopause			
No	Reference	Reference	Reference
Yes	2.62	.00	0.82 (0.61–1.09)
Age	1.04	.00	1.04 (1.03–1.05)
Pregnancy			
No	Reference	Reference	Reference
Yes	3.55	.00	1.49 (1.13–1.96)
Hysterectomy			
No	Reference	Reference	Reference
Yes	1.92	.00	0.90 (0.61–1.33)
Diabetes			
No	Reference	Reference	Reference
Yes	2.68	.00	1.51 (1.14–2.02)
Exercise			
No	Reference		
Yes	0.45	.00	0.75 (0.53–1.06)
Occupation			
Governmental job	Reference	Reference	Reference
Self-employed	1.47	.06	1.49 (0.99–2.24)
Student	1.36	.1	1.81 (1.23–2.66)
Retired	2.69	.001	1.38 (0.91–2.09)
Housewife	2.30	.001	1.75 (1.33–2.31)
Smoking			
No	Reference	Reference	Reference
Yes	1.89	.17	1.22 (0.46–3.23)
HRT			
No	Reference	Reference	Reference
Yes	0.45	.05	0.52 (0.21–1.29)
Marital status			
Single	Reference	Reference	Reference
Married	1.49	.00	1.32 (0.37–4.67)

TABLE 3 (Continued)

Variable	Unadjusted odds ratio	*p*	Adjusted odds ratio (95% CI)
Divorced	1.24	.5	1.95 (0.32–11.68)
Widowed	4.0	.00	2.76 (0.75–10.13)

[a]Numbers are reported as OR and (95% confidence interval); OR, odds ratio; Adjusted OR (controlling for demographic and CAD risk factors); CI, confidence interval.

findings, the prevalence of urinary incontinence was 63%. According to the literature review, the prevalence of urinary incontinence in women ranges from 10% to 69%.[19–23] Several factors, such as the definition of urinary incontinence, may account for the wide range. A quite wide range has also been reported in studies, which were only based on the individual's history. However, studies based on valid questionnaires, which grade the severity of symptoms, can provide more accurate information regarding the prevalence of this condition.[23] In the present study, valid questionnaires, that is, UDI-6 was used, and a general practitioner asked the questions precisely.

Another factor that can influence the results is the study population. In other words, the prevalence is lower in younger participants, while it is higher in older individuals, such as elderly women living in nursing homes. In this study, the study population was completely heterogeneous and included age groups, 15–80 years. Another influential factor is the time span during which the patients were asked about their symptoms since the results are more accurate in a more limited time span. In this study, the patients were questioned about their symptoms in the past 30 days; however, a more limited time span would be more desirable.

According to a population-based study conducted in the United States, the total prevalence of urinary incontinence was reported to be 45%, ranging from 28% in women aged 30–39 years to 55% in women aged 80–90 years.[19] In addition, Almousa et al.,[24] in a systematic review, investigated the prevalence of urinary incontinence in several countries (especially European countries). On average, the total prevalence was reported to be 20%. The prevalence of stress incontinence was 49%, urgency incontinence 31%, and mixed incontinence 25%. Moreover, according to a review study conducted by Basak et al.,[25] the prevalence of urinary incontinence in Turkish women ranged from 16.4% to 49.7%. Moreover, the prevalence of mixed, urgency, and stress urinary incontinence was 7.8%–64.3%, 2.9%–43%, and 20.8%–68%, respectively.[25]

In Iran, only two population-based studies have been conducted on this matter. The first study was conducted by Ahmadi et al.[16] on 800 women the results of which showed that the average prevalence of urinary incontinence was 38.4% in women aged 40 years and above in Tehran. The prevalence of this condition in women aged 40–49, 50–59, 60–69, and >70 years was reported to be 38.3%, 40.9%, 34.5%, and 37%, respectively. Since Tehran is the capital of Iran, and its people have a higher economic and cultural status than other people in most other cities of Iran, the rates were lower than what we reported in this study. Furthermore, in the aforementioned study, the patients were asked about severe and problematic urinary incontinence (i.e., stress and daily urinary incontinence) or use of sanitary pads due to urinary incontinence, while in the present study, valid questionnaires were used, and various types of urinary incontinence, even the mild type, were investigated; therefore, the prevalence rate was higher in this study.

The second population-based study in Iran was conducted by Morowatisharifabad et al.,[26] which investigated the prevalence of urinary incontinence in 127 women aged above 60 years in Yazd (one of the central cities in Iran). In their study, the prevalence of urinary incontinence was estimated to be 62.2%. However, the presented study was conducted on 3100 people aged 15–80 years and included the largest number of participants and the widest age range among studies conducted in Iran, which is the main strength of this study.

In several studies, attempts have been made to determine the proportion of women suffering from different types of urinary leakage, SUI, UUI, and MUI. In the present study, the most prevalent type of urinary incontinence in women aged below 60 years was stress incontinence; however, mixed urinary incontinence was the most commonly reported among women aged above 60, followed by urgency incontinence. The difference in the distribution of types of urinary incontinence, between the ages below 60 and above 60, may be due to the increasing prevalence rates of overactive bladder (OAB wet) with age. In the literature, SUI tends to dominate among younger women, while the number of women with urgency incontinence and mixed incontinence increases with age.[14]

The majority of the population who experienced incontinence in this survey were only mildly bothered by their condition.

5 | RISK FACTORS OF URINARY INCONTINENCE AMONG IRANIAN WOMEN

In the present study, the relationship of age, BMI, marital status, educational level, occupational status, smoking, exercise, hormonal status, history of diabetes and hysterectomy, anxiety, and depression with urinary incontinence were studied. Based on the univariate regression analysis, variables of education, occupational status, and marital status had significant relationships with urinary incontinence. However, in the multivariate analysis, this relationship did not reach statistical significance. The observed relationship in the univariate regression analysis could be due to the confounding effect of age. In the multivariate regression, no significant relationship was observed after controlling for the effect of age. Moreover, in studies by Liu et al. and Moudi, the prevalence of urinary incontinence was higher in widows and divorced women. In contrast, in the present study, marital status had no significant relationship with urinary incontinence.[7,27]

The educational level was another factor analyzed in the present study. No significant relationship was found in this study, similar to the study by Moudi.[27] However, Kriss et al.[28] and Liu et al.[7] introduced educational level as a risk factor for having urinary incontinence; in other words, lower levels of education increased the odds of having incontinence. Although no precise reason was found for the relationship between educational level and urinary incontinence.

Urinary incontinence and BMI were the most significant predictors in the present study. This finding was in accordance with the results reported by Grodstein et al., Hannestad et al., Vandoninck et al., and Rortveit et al.[29–32] However, studies conducted by Moudi et al.,[27] Nojomi et al.,[33] and Prabhu and Shanbhag[34] were inconsistent with the present study. Therefore, an increase in weight, and subsequently BMI, causes an increase in intra-abdominal and pelvic pressure during daily activities, which in turn increases the pressure on the bladder. Recurrence of these conditions contributes to functional disorders of the pelvic floor and urinary tract, especially urinary incontinence. In a study by Hunskaar,[35] in addition to BMI, waist-to-hip ratio, and therefore abdominal obesity, could also be an independent factor for incontinence in women. Overactive bladder (OAB) and urinary urgency incontinence (UUI) are associated with metabolic syndrome components as well. Gorbachinsky et al. noted that the rates of OAB are almost three times higher in obese women, regardless of diabetes status.[36]

In studies conducted by Sumardi et al.,[37] Liu et al.,[7] Kirss et al.,[28] Zhu et al.,[38] Minassian et al.,[39] and Biri et al.[40] the prevalence of urinary incontinence increased with age. This can be a result of anatomical and physiological changes in the urogenital system, such as degeneration of muscles and connective tissue, reduced bladder capacity, increased detrusor overactivity, and decreased bladder contractile efficiency.

The present results indicated that with each year increase in age, the odds of having urinary incontinence also increased significantly by approximately 4%. Moreover, it was found that incontinence type changes with age. Our findings showed that at young age, stress and urgency incontinence are the most common types of incontinence, with almost the same prevalence rates. In middle-aged people, stress incontinence is the most common type of incontinence, while in people aged above 60 years, the most prevalent type is mixed incontinence. The impact of aging on urinary incontinence is attributed to numerous factors; in such a way that several structural changes that occur in the bladder with aging have been linked to functional changes that can cause UI, such as increased involuntary detrusor contractions and decreased bladder elasticity and compliance. These alterations can lead to changes in urine storage and bladder emptying. Moreover, pelvic floor muscle dysfunction is common among elderly women, and decreased striated muscle density in the urethral sphincter can lead to an increased propensity for urinary incontinence.

In addition, age-related diseases, such as diabetes, constipation, etc., play an important role, as well.

However, in studies conducted by Sensoy et al.[41] and Moudi et al.,[27] no significant relationship was observed between age and urinary incontinence, and the results of these studies were not in line with our findings.

Pregnancy is another factor, which can cause urinary incontinence. In this regard, MacArthur et al.[42] indicated that developing urinary incontinence is common after pregnancy, with a prevalence of 33%–40%; recovery rate was reported to decrease over time. In the present study, the odds of having the condition in individuals with a history of pregnancy was 49% more than others, and this relationship was significant. Pregnancy can lead to anatomic and physiologic changes in pelvic support tissue, which are important for preventing UI.

According to studies conducted by Bump and McClish, Fuganti et al., and Richter et al.,[43–45] smoking increases the risk of urinary incontinence. Moreover, in the study conducted by Hannestad et al.,[30] smoking more than 20 cigarettes a day increased urinary incontinence;

however, this finding is not in line with those of the present study.

Urinary incontinence is more prevalent among people with underlying diseases, such as diabetes and depression. In this regard, studies conducted by Lifford et al.[46] and Phelan et al.[47] showed that the prevalence of urinary incontinence was two times as high in women with diabetes, compared with others. The present study showed that diabetes increases the adjusted odds of having the condition by 50%.

There was a definite association between diabetes and urinary incontinence in studies conducted by Brown et al.,48 Ebbesen et al.,[49] and Brown et al.[50] In one of these studies, Brown et al.[51] claimed that diabetes increases the odds of developing urgency incontinence by 50%, while it has no impact on stress incontinence. Furthermore, smaller studies have shown that the duration, severity, treatment, glycemic control, and peripheral neuropathy of diabetes[52–55] are all associated with the increased risk of urinary incontinence.

Moreover, depression was associated with urinary incontinence in women. Although this relationship was multifactorial, it was found that depression could lead to urinary incontinence in women.[56] In addition, studies conducted by Minassian et al.[39] and Biri et al.[40] showed that stress and anxiety in women were the main risk factors for urinary incontinence. Furthermore, the findings of the present study revealed that anxiety increases the odds of having urinary incontinence, and depression is associated with the condition.

Although oral consumption of estrogen hormone, with or without progesterone, has been known as a urinary incontinence risk factor,[57] there was no significant relationship between hormone consumption and urinary incontinence in the present study. In addition, no significant relationship was found between hysterectomy and urinary incontinence in the present study, while a study conducted on 25,000 women in Sweden revealed that 8.5% of people who did not suffer from urinary incontinence (70%) developed urgency urinary incontinence after hysterectomy.[58]

Furthermore, Brown et al.[50] showed that hysterectomy was a risk factor for urinary incontinence. According to a study by Milsom et al.,59 urinary incontinence was more prevalent among women who had a history of hysterectomy. According to some research, hysterectomy is an independent risk factor for urinary incontinence.[60–63] However, the effects of age and menopause reported in these studies were not uniform. In some studies, the prevalence of incontinence decreased at menopause age,[64–66] and in some studies, an increase was observed at an older age.[67,68] However, in some cases, age had no significant effects.[69] Also, a study showed that incontinence was associated with menopause in 70% of women,[70] while another study found no significant association between menopause and incontinence.[71] In the present study, no significant association was found between menopause and urinary incontinence.

Our findings can be useful in providing an updated view of urinary incontinence among adults. However, further follow-up studies need to be conducted to assess the impact of the ongoing measures taken to help policymakers to decide on the best cost-effective interventions.

This study was based on invitations sent by letters or via phone. In addition, a GP completed the questionnaire for all subjects, which was one of the limitations of the study. Furthermore, the role of other risk factors for UI (e.g., sleep problems, dietary pattern,s and alcohol consumption) needs further investigations in future studies.

6 | CONCLUSION

The present study showed that urinary incontinence is a prevalent condition among Iranian women. According to the present results, the risk factors for urinary incontinence included old age, obesity, history of pregnancy, and underlying diseases, such as diabetes, anxiety, and depression. As far as we know, no comprehensive study has been conducted in Iran so far. Therefore, the findings of this study can be employed in health planning and preventive strategies for this epidemic disease.

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This study was also approved by the Research Ethics Committee of Kerman University of Medical Sciences (Code number: IR.kmu.rec.1394.82).

AUTHOR CONTRIBUTIONS

Azar Daneshpajooh: project development and manuscript writing; Ahmad Naghibzadeh Tahami: data analysis and manuscript writing; Hamid Najafipour: original draft preparation and data collection; Mahbube Mirzaie: manuscript writing and editing.

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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