Original Article

The Prevalence and Predictive Factors of Genitourinary Syndrome of Menopause in Postmenopausal Women: A Cross-sectional Study

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Abstract

Background: Genitourinary Syndrome of Menopause (GSM) refers to signs and symptoms caused by estrogen deficiency in the genitourinary system. Given the importance of GSM in women's health during menopause, the present study was designed to determine its prevalence and predict factors for postmenopausal women in Gonabad City.

Methods: This cross-sectional-analytical study was conducted on 455 postmenopausal women (45-75 years old) referring to three Comprehensive Health Service Centers in Gonabad City, Iran, from September 2021 to July 2022. A stratified random sampling method was applied. Demographic and reproductive questionnaire, urogenital complaints checklist, the Day-to-Day Impact of Vaginal Aging (DIVA) questionnaire, and vaginal examination were used to collect the data. Data were analyzed using the SPSS software version 16.0 using descriptive statistics and independent t-test, Mann-Whitney test, chi-square test, and logistic regression models at the significance level of $P<0.05$.

Results: Of the 455 participants, 238 (52.3%) had GSM. The most common complaints among the participants were urinary incontinence, which was present in 179 (39.34%) participants, and dyspareunia, which was present in 94 (20.66%) participants. Women in the GSM group reported a higher prevalence of dysuria, urinary frequency, urgency, and incontinence, as well as dyspareunia, postcoital bleeding, vaginal dryness, vulvar irritation, and vulvar burning or itching compared to the non-GSM group ($P<0.001$). Age ($P=0.025$), gravida ($P=0.018$), and urinary problems ($P<0.001$) were predictive factors for GSM.

Conclusions: The prevalence of GSM was remarkable in postmenopausal women in Gonabad. Identifying age, gravida, and urinary problems as key predictors of GSM highlights the importance of early screening and tailored management strategies for at-risk populations.

Keywords: Female urogenital diseases, Post menopause, Prevalence, Women

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Introduction

Menopause is the permanent cessation of menstruation due to the termination of ovarian activity, which occurs and is defined as the cessation of menstruation for 12 months.[1] Today, a woman in developed countries spends about 30 years or one-third of her life in postmenopausal state.[1, 2] Therefore, it is necessary to maintain postmenopausal women's optimal health and functionality during this period.[1, 2] Menopause is associated with problems like vasomotor symptoms, urogenital symptoms, sexual disorders, osteoporosis, cardiovascular diseases, cancer, and cognitive disorders, which can have a dramatic effect on the health and quality of life during this period.[1]

Genitourinary syndrome of menopause (GSM) is defined as anatomical changes and symptoms secondary to estrogen deficiency that affect the labia, vagina, urethra, and bladder.[1] GSM affects 50% of postmenopausal women and 15% of premenopausal women.[3, 4] The symptoms of GSM are vaginal dryness, irritation of the vulva or vagina, reduced lubrication, dyspareunia, postcoital bleeding, dysuria, urinary frequency, and urinary urgency. The signs of GSM include decreased moisture, decreased elasticity, loss of vaginal rugae, vaginal pallor, vaginal petechiae, labia minora resorption, and recurrent urinary tract infections.[5]

Several factors are effective in the incidence and severity of GSM, including the length of time since menopause, smoking, alcohol abuse, lack of physical activity, ovarian failure, nulliparity, bilateral oophorectomy, and reduced or avoiding sexual activity.[4, 6] A study in China stated that the risk of GSM was higher in postmenopausal women with a history of at least two abortions, obesity (body mass of more than 30 kg/m^2), and diabetes.[7] In another study, GSM signs and symptoms were more common among women with a low level of education, a history of chronic diseases, and prolonged medication use.[1]

The diagnosis of GSM is based on genitourinary signs and symptoms (at least two signs or one sign and one symptom) related to menopause that cannot be explained by other pathologies.[5] Pelvic physical examination is helpful to rule out other differential diagnoses, including infections, inflammatory vaginitis, dermatosis, and neoplasm. It is also necessary to take a detailed history of the person's gynecological history.[8, 9] Since GSM is significantly associated with urogenital pathologies like stress incontinence, mixed incontinence, overactive bladder, and vaginal prolapse, more evaluation is needed in postmenopausal women with these overlapping symptoms.[5] These symptoms may cause uncomfortable feelings, stress, anxiety, and depression in postmenopausal women.[10]

GSM often remains undiagnosed due to the shame of expressing sexual issues or considering the symptoms as a part of the natural aging process.[11] It was previously reported that 40% of women with GSM refrained from sexual intercourse due to dyspareunia and felt ashamed to express their problems.[12]

There is limited information about GSM in Asia compared to Western societies, perhaps because women in this region are more conservative with these issues due to cultural and religious reasons and limited access to healthcare providers.[7, 13] To the best of our knowledge, there is limited information regarding GSM in the Iranian population. An increase in the life expectancy of postmenopausal women has exposed women to extended menopause duration, which implies the importance of GSM diagnosis and treatment. Therefore, understanding the prevalence and predicting factors of GSM could help stakeholders evaluate the current situation and design preventive measures for GSM. Besides, identifying the prevalence and common symptoms of GSM in the community may be beneficial for clinicians in diagnosing and managing GSM. Therefore, this study was conducted to determine the prevalence of GSM and its related factors in postmenopausal women in Gonabad City, Iran.

Materials and Methods

This cross-sectional study was conducted on postmenopausal women living in Gonabad, North West of Iran, from September 2021 to July 2022. The report was prepared based on the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement checklist for cross-sectional studies.[14]

The inclusion criteria were postmenopausal women aged 45- 75 years, experiencing the last menstruation at least 12 months before enrolment in the study and natural menopause; being married at least once; being willing to participate; having no history of any vaginitis or cervicitis (based on history taking); having no previous history of hormone replacement therapy, hysterectomy or oophorectomy; and not being diagnosed or receiving medications for psychological diseases. The exclusion criteria were any vaginal bleeding or gynecologic disease during the study period, refusal to continue participation in the research and incomplete questionnaires.

To the best of our knowledge, no study has determined the prevalence of GSM among the Iranian population; therefore, the sample size was determined based on a pilot study based on the sample size formula for prevalence $n = \frac{z^2_{1-\frac{\alpha}{2}} pq}{d^2}$, considering α=0.05, d=0.045 and P=0.525 obtained from a pilot study. The calculated sample size was 474 participants, which was increased to 500 to account for the potential dropout rate.

Participants were selected based on a stratified random sampling method. Each of the comprehensive health service centers was considered a stratum. Three Comprehensive Health Centers were selected out of six city centers. The participants were randomly selected from the list of postmenopausal women in each center. The number of participants from each center was determined based on the proportion of the population covered by the center. Data were collected using demographic and reproductive questionnaires, urogenital complaints checklist, vaginal examination checklist, and the day-to-day impact of vaginal aging (DIVA) questionnaire.

The demographic and reproductive questionnaire consisted of personal characteristics (including age, spousal age, marriage duration, body mass index, physical activity, menopause duration, age at menarche, gravida, parity, number of abortions, number of intercourse per month, marital status, delivery type, occupation, spousal occupation, education level, income level, smoking, diabetes, hypertension, cardiovascular disease, hypothyroidism, insomnia, history of infertility, history of disease in spouse, and type of disease in the spouse. The initial version of the questionnaire was prepared after studying the latest sources, and the final version was prepared and confirmed based on the opinions of experts in gynecology and reproductive health.

The urogenital complaints checklist consists of the symptoms of GSM, including dysuria, urinary frequency, urinary urgency, urinary incontinence, dyspareunia, postcoital bleeding, vaginal dryness, vulvar irritation, and vulvar burning or itching. The participants completed this checklist.

The vaginal examination checklist consists of clinical findings on the GSM signs such as vaginal shortening, decreased vaginal elasticity, labial atrophy, vaginal prolapse, vaginal petechia/fissure/mucosa break, loss of rugae, decreased vaginal moisture, and vaginal paleness. A gynecologist (first author) completed this checklist for all participants after vaginal examination.

The DIVA is a brief yet comprehensive tool to identify the symptoms and facilitate the diagnosis of GSM. The questionnaire was developed in 2015 by Huang et al. among a cohort of symptomatic women in California. The questionnaire includes a total of 23 items. It evaluates the effect of menopausal vaginal symptoms on four domains, namely activities of daily living (5 items), self-concept and body image (5 items), emotional well-being (4

items), and sexual functioning (9 items). Each item is scored on a five-point Likert scale (0= not at all, 1= little, 2= relatively, 3= a lot, and 4= very much). The total scores for each domain scale are determined by averaging the scores of the respective individual items. Each domain scale has a potential score range of 0 to 4, where higher scores indicate a more pronounced vaginal symptoms impact.[15]

The structure of the original questionnaire was assessed using exploratory and confirmatory factor analyses, revealing that the comparative fit index and standardized root-mean-square residual values were 0.987 and 0.038, respectively, for the four-component model. The questionnaire demonstrated good validity based on previous studies' correlations with other measures of related constructs. For instance, a study confirmed the internal consistency and test-retest reliability of the questionnaire using Cronbach's alpha (ranging from 0.82 to 0.93 for questionnaire domains) and intraclass correlation coefficient (ranging from 0.47 to 0.72 for questionnaire domains).[15] In another study on the validity of the DIVA questionnaire for detecting GSM, the DIVA questionnaire improved the GSM diagnosis by 30.7% in a sample of women who were 45 years or older.[16]

In the present study, the Content Validity Ratio (CVR) and Content Validity Index (CVI) were employed to assess the content validity of the questionnaire. The CVR was determined by 20 experts who rated each item on a necessity scale. All the items had a CVR value above 0.42 and were retained based on established criteria.[17] The CVI was calculated for each item (I-CVI) by judging experts on the item's relevancy, clarity, and simplicity on a Likert scale. The item was considered appropriate if the I-CVI was higher than 0.79.[18] All items achieved an I-CVI score above 0.8. The S-CVI (S-CVI/Ave was 0.90 was acceptable.[19]

Cronbach's alpha coefficient values confirmed the reliability of the questionnaires. It was 0.92 for the entire questionnaire, ranging between 0.61 and 0.96 for the four domains.

The researcher contacted the participants to screen them based on the eligibility criteria and enrolled them if they were willing to participate in the study. After confirming that the individuals met the eligibility criteria of the study, they were invited to participate. Initially, written informed consent was obtained from the participants. Subsequently, they were asked to complete the demographic and reproductive questionnaire, the urogenital complaints checklist, and the DIVA questionnaire.

Then, the participants underwent a vaginal examination to evaluate signs of GSM and the vaginal examination checklist was completed. A diagnosis of GSM was established based on the presence of at least two signs or one sign and one symptom of the condition.

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 16.0. The normality of the quantitative variables was checked using the Kolmogorov-Smirnov test. To describe the quantitative and qualitative variables, we used mean (standard deviation [SD]) and number (percentage), respectively. In case the variables were normally distributed, the independent t-test was used to compare the quantitative variables between GSM and non-GSM groups. In contrast, the Mann-Whitney test was used for non-normally distributed variables. The chi-square test was also used to compare qualitative variables between the two groups. The logistic regression models were used to determine the contribution of each variable to predicting GSM in the presence of other potentially related variables in the model. The variables with $P<0.25$ in the simple logistic regression models were entered into the multiple logistic regression model[20] and considered significant if their P-value was less than 0.05.

This study was approved by the Gonabad University of Medical Sciences Ethics Committee (IR.GMU.REC.1399.133). All participants were informed about the purpose of the research and signed a written informed consent form before participating. All examinations were free of charge, and the anonymity of all participants was preserved.

Table 1: The characteristics of the participants

Variable		Total Mean±SD[b]	GSM[c] Mean±SD	Non-GSM Mean±SD	P value
Age (year),		58.76±6.96	57.90±7.17	55.4±6.46	<0.001*
Spousal age (year)		60.67±8.20	62.50±8.61	58.4±7.11	<0.001*
Marriage duration (year)		36.97±9.48	38.50±9.69	35.2±8.96	<0.001*
BMI (kg/m^2)[a]		25.86±3.39	25.90±3.49	25.7±3.26	0.515*
		Median (IQR[d])	**Median (IQR)**	**Median (IQR)**	
Physical activity (min/week)		0.00 (20.00)	102.50 (158.39)	98.48 (146.39)	0.987**
Menopause duration (year)		5.00 (8.00)	5.00 (9.00)	4.00 (8.00)	0.032**
Age at menarche (year)			13.00 (2.00)	14.00 (1.00)	0.909**
Gravida		4.00 (2.00)	4.00 (2.25)	4.00 (2.02)	0.138**
Parity		4.00 (2.00)	4.00 (2.00)	3.00 (2.00)	0.378**
Number of abortions		0.00 (1.00)	0.00 (210.00)	0.00 (1.00)	0.430**
Number of intercourses per month		2.00 (2.00)	1.00 (3.00)	2.00 (3.00)	0.012**
		n (%)	**n (%)**	**n (%)**	
Marital status	Married	386 (84.84)	205 (86.13)	181 (83.41)	0.418***
	Single/Widowed/Divorced	69 (15.16)	33 (13.87)	36 (16.59)	
Delivery type [e]	Normal vaginal delivery	347 (77.98)	187 (80.95)	160 (74.77)	0.258****
	Cesarean section	37 (8.32)	17 (7.36)	20 (9.35)	
	Both methods	60 (13.48)	26 (11.26)	34 (15.88)	
	Instrumental delivery	1 (0.22)	1 (0.43)	0 (0.00)	
Occupation	Housewife	377 (82.86)	197 (82.77)	180 (82.95)	0.960***
	Employed	78 (17.14)	41 (17.23)	37 (17.05)	
Spousal occupation [f]	Employee	35 (9.08)	11 (5.37)	24 (13.26)	0.031***
	Worker	59 (15.28)	37 (18.05)	22 (12.15)	
	Freelance	145 (37.56)	77 (37.56)	68 (37.57)	
	Retired	147 (38.08)	80 (39.02)	67 (37.02)	
Education level	Illiterate	74 (16.26)	44 (18.49)	30 (13.82)	0.060***
	Primary	242 (53.19)	137 (57.56)	105 (48.39)	
	Secondary	90 (19.78)	38 (15.97)	52 (23.96)	
	Diploma	18 (3.96)	7 (2.94)	11 (5.07)	
	Bachelor	26 (5.71)	10 (4.20)	16 (7.38)	
	Masters and above	5 (1.10)	2 (0.84)	3 (1.38)	
Income level	Insufficient	71 (15.60)	40 (16.81)	31 (14.16)	0.745***
	Sufficient	346 (76.05)	179 (75.21)	167 (77.16)	
	More than sufficient	38 (8.35)	19 (7.98)	19 (8.68)	
Smoking	Yes	1 (0.22)	0 (0.00)	1 (0.46)	0.477****
	No	454 (99.78)	238 (100.0)	216 (99.54)	
Diabetes	Yes	88 (19.34)	53 (22.27)	35 (16.13)	0.098***
	No	367 (80.66)	185 (77.73)	182 (83.87)	
Hypertension	Yes	144 (31.65)	92 (38.66)	52 (23.96)	0.001***
	No	311(68.35)	146 (61.34)	165 (76.04)	
Cardiovascular disease	Yes	57 (12.53)	37 (15.55)	20 (9.22)	0.042***
	No	398 (87.47)	201 (84.45)	197 (90.78)	
Hypothyroidism	Yes	38 (8.35)	20 (8.40)	18 (8.29)	0.967***
	No	417 (91.65)	218 (91.60)	199 (91.71)	
Insomnia	Yes	117 (25.71)	69 (28.99)	48 (22.12)	0.391***
	No	338 (74.29)	169 (71.01)	169 (77.88)	
History of infertility	Yes	15 (3.30)	7 (2.94)	8 (3.69)	0.656***
	No	440 (96.70)	231 (97.06)	209 (96.31)	
History of disease in spouse	Yes	90 (23.32)	59 (28.78)	31 (17.13)	0.008***
	No	296 (76.68)	146 (71.22)	150 (82.87)	
Type of disease in spouse	Diabetes	38 (42.22)	25 (42.37)	13 (41.94)	0.750***
	Hypertension	23 (25.56)	16 (27.12)	7 (22.58)	
	Cardiovascular disease	11 (12.22)	8 (13.56)	3 (9.67)	
	Other	18 (20.00)	10 (16.95)	8 (25.81)	

[a]BMI: Body Mass Index; [b]SD: Standard Deviation; [c]GSM: Genitourinary syndrome of menopause; [d]IQR: Interquartile range; [e] "Delivery type" was assessed in participants with a history of childbirth (n=445); [f] "Spousal occupation" was assessed in married participants (n=386); * Independent t-test; ** Mann-Whitney test; *** Chi square test; **** Fisher's exact test

Results

A total of 455 postmenopausal women were evaluated in this study. The prevalence of GSM was 238 participants (52.3%). The characteristics of the participants by GSM and non-GSM groups are presented in Table 1. Participants in the GSM group were significantly older (P<0.001), had longer menopause duration (P=0.032), had fewer intercourse frequency (P=0.012), and had more history of hypertension (P=0.001) and cardiovascular disease (P=0.042) compared to the non-GSM group.

The comparison of the severity of genitourinary complaints between GSM and non-GSM groups is presented in Table 2. The most common symptoms of GSM among the participants were urinary incontinence, which was present in 179 (39.34%) participants, and dyspareunia, which was present in 94 (20.66%) participants. Women in the GSM group reported a higher prevalence of dysuria, urinary frequency, urgency, and incontinence, as well as dyspareunia, postcoital bleeding, vaginal dryness, vulvar irritation, and vulvar burning or itching compared to the non-GSM group (P<0.001). All the evaluated complaints were more severe in the GSM group than in the non-GSM group (Table 2).

The comparison of the severity of pelvic examination findings between GSM and non-GSM groups is presented in Table 3. All pelvic examination findings were more severe in the GSM group compared

Table 2: Comparison of the severity of genitourinary complaints between women with and without genitourinary syndrome of menopause

Variable		GSM [a] N (%)	Non-GSM N (%)	P value
Dysuria	No	184 (77.30)	206 (94.90)	<0.001*
	Moderate	49 (20.60)	10 (4.60)	
	Severe	5 (2.10)	1 (0.50)	
Urinary frequency	No	152 (63.90)	201 (92.60)	<0.001**
	Moderate	69 (29.00)	14 (6.50)	
	Severe	17 (7.10)	2 (0.90)	
Urinary urgency	No	170 (71.50)	212 (97.70)	<0.001**
	Moderate	52 (21.80)	5 (2.30)	
	Severe	16 (6.70)	0 (0.00)	
Urinary incontinence	No	59 (24.80)	217 (100.00)	<0.001**
	Moderate	150 (63.00)	0 (0.00)	
	Severe	29 (12.20)	0 (0.00)	
Dyspareunia [+]	No	80 (46.00)	165 (100.00)	<0.001*
	Moderate	86 (49.40)	0 (0.00)	
	Severe	8 (4.60)	0 (0.00)	
Postcoital bleeding [+]	No	167 (95.98)	163 (98.80)	<0.001**
	Moderate	6 (3.45)	2 (1.20)	
	Severe	1 (0.57)	0 (0.00)	
Vaginal dryness	No	146 (61.30)	194 (89.40)	<0.001**
	Moderate	72 (30.30)	21 (9.70)	
	Severe	20 (8.40)	2 (0.90)	
Vulvar irritation	No	195 (81.90)	205 (94.50)	<0.001*
	Moderate	39 (16.40)	12 (5.50)	
	Severe	4 (1.70)	0 (0.00)	
Vulvar burning or itching	No	188 (79.00)	202 (93.10)	<0.001*
	Moderate	44 (18.50)	14 (6.40)	
	Severe	6 (2.50)	1 (0.50)	

[a] GSM: Genitourinary Syndrome of Menopause, * Exact test, ** Chi-square test; [+] Complaints of dyspareunia and postcoital bleeding were not evaluated in those who reported no intercourse. Among those affected by GSM, 64 individuals (26.89%) reported no sexual activity, and in the non-GSM group, 52 individuals (23.96%) reported no sexual activity.

Table 3: Comparison of the severity of pelvic examination findings between women with and without genitourinary syndrome (GSM) of menopause

Variable		GSM [a] N (%)	Non-GSM N (%)	P value*
Vaginal shortening	Severe	5 (2.1)	1 (0.5)	<0.001
	Moderate	89 (37.4)	42 (19.3)	
	No	144 (60.5)	174 (80.2)	
Decreased vaginal elasticity	Severe	21 (8.8)	2 (0.9)	<0.001
	Moderate	137 (57.6)	74 (34.1)	
	No	80 (33.6)	141 (65.0)	
Labia atrophy	Severe	21 (8.8)	3 (1.4)	<0.001
	Moderate	115 (48.3)	67 (30.9)	
	No	102 (42.9)	147 (67.7)	
Vaginal Prolapse	Severe	29 (12.2)	8 (3.7)	<0.001
	Moderate	136 (57.1)	77 (35.5)	
	No	73 (30.7)	132 (60.8)	
Vaginal petechia/fissure/ mucosa break	Severe	5 (2.15)	1 (0.5)	<0.001
	Moderate	87 (36.6)	34 (15.7)	
	No	146 (61.3)	182 (83.8)	
Loss of rugae	Severe	22 (9.3)	6 (2.8)	<0.001
	Moderate	164 (68.9)	103 (47.5)	
	No	52 (21.8)	108 (49.7)	
Decreased vaginal moisture	Severe	31 (13.0)	2 (0.9)	<0.001
	Moderate	140 (58.8)	88 (40.6)	
	No	67 (28.2)	127 (58.5)	
Vaginal paleness	Severe	23 (9.6)	9 (4.1)	<0.001
	Moderate	147 (61.8)	110 (50.7)	
	No	68 (28.6)	98 (45.2)	

[a] GSM: Genitourinary Syndrome of Menopause; *Fisher's exact test

Table 4: Comparison of the total and domain scores of the day-to-day impact of vaginal aging questionnaire between women with and without genitourinary syndrome of menopause

Domain score	GSM [a] Median (IQR[b])	Non-GSM Median (IQR)	P value*
Activities of daily living	0.00 (0.20)	0.00 (0.00)	<0.001
Self-confidence and body image	0.00 (0.25)	0.00 (0.00)	<0.001
Emotional health	1.68 (2.00)	0.00 (1.87)	<0.001
Sexual function	0 (0.60)	0.00 (0.00)	<0.001
Total	0.68 (1.04)	0.00 (0.68)	<0.001

[a] GSM: Genitourinary Syndrome of Menopause, [b]IQR: Interquartile Range, * Mann-Whitney test

to the non-GSM group (P<0.001). The most common signs of GSM among the participants were the loss of rugae, which was present in 186 (78.2 %) of participants; decreased vaginal moisture, which was present in 171 (71.8 %) of participants; and vaginal paleness, which was present in 170 (71.4%0(of participants (Table 3).

The comparison of the total and domain scores of the DIVA questionnaire between GSM and non-GSM groups is presented in Table 4. There was a statistically significant difference in the median score for total and all domains of the DIVA questionnaire between the GSM and non-GSM groups (P<0.001).

The relationship between the study variables and GSM is presented in Table 5. Based on the multiple logistic regression model, age demonstrated a statistically significant positive relationship with GSM. Specifically, for each one-year increase in age, the odds of developing GSM increased by 6% (OR=1.06, P=0.025) after adjusting for all other variables in the model.

Table 5: Analysis of logistic regression model of potential factors of genitourinary syndrome of menopause

Variable		Simple logistic regression model				Multiple logistic regression model			
		OR[a]	95% CI[b] for OR		P value	OR	95% CI for OR		P value
			Lower	Upper			Lower	Upper	
Age (year)		1.06	1.03	1.09	<0.001	1.06	1.01	1.12	0.025
Gravida		1.06	0.97	1.15	0.182	0.83	0.72	0.97	0.018
Insomnia	Yes	-	-	-	-	-	-	-	-
	No	0.70	0.45	1.06	0.095	0.896	0.477	1.684	0.734
Diabetes	Yes	-	-	-	-	-	-	-	-
	No	0.67	0.42	1.08	0.099	0.995	0.495	1.002	0.990
Hypertension	Yes	-	-	-	-	-	-	-	-
	No	0.50	0.33	0.75	0.001	0.921	0.486	1.745	0.803
Cardiovascular disease	Yes	-	-	-	-	-	-	-	-
	No	0.55	0.31	0.98	0.044	0.837	0.352	1.989	0.688
Urinary problems	Yes	-	-	-	-	-	-	-	-
	No	0.03	0.02	0.05	<0.001	0.027	0.015	0.048	<0.001
Education	Illiterate	-	-	-	-	-	-	-	-
	High school and below	0.76	0.46	1.27	0.293	1.337	0.610	2.928	0.467
	University education	0.43	0.21	0.90	0.026	1.002	0.331	3.036	0.996

[a]OR: Odds Ratio; [b]CI: Confidence interval

A significant inverse relationship was observed between gravida and GSM. Each additional pregnancy was associated with a 17% reduction in the odds of developing the syndrome (OR=0.83, P=0.018), holding all other variables constant. Furthermore, the absence of urinary problems was strongly associated with a reduced likelihood of GSM. After controlling for other covariates, individuals without urinary problems had 97.3% lower odds of developing the syndrome than those with urinary problems (OR=0.027, P<0.001).

Discussion

The present study indicated that more than half of the participants had GSM. The most common symptoms of GSM were urinary incontinence and dyspareunia, and the most common signs of GSM were loss of rugae, decreased vaginal moisture, and vaginal paleness. Also, the present study found that GSM was significantly related to age, gravida, and urinary problems.

Previous studies have reported different prevalence rates for GSM. The North American Menopause Society Position Statement 2020 reported that GSM affected approximately 27% to 84% of postmenopausal women,[8] while another study that evaluated Chinese women aged 40 to 65 reported that GSM was identified in 30.8% of the participants.[7] In another cross-sectional survey of Turkish women in the age range of 43 to 75 years, the prevalence of GSM was reported to be 71.5%.[21] This contradiction in the different prevalence rates of GSM can be due to the study population. For example, in the Chinese report, the study population consisted of women who were referred for routine physical examination;[7] in the Spanish report, the study population comprised women who were referred to gynecologists due to any complaint;[5] moreover in the Turkish report, the study population consisted of postmenopausal women who referred to urology and gynecology clinics.[21] Also, differences in the sample size and study design (single center vs. multicenter), and age difference of the participants in the studies, due to the increase in symptoms by increase in age, and different definitions for GSM based on the number of present symptoms can be the cause of the contradiction.[21]

The the current study, the most common complaints were urinary incontinence and dyspareunia. In a previous study conducted in Iran on 433 postmenopausal women, the prevalence of urinary incontinence was 39.5%, which was lower than the findings of the present study.[22] This difference might be due to the different tools used to assess urinary symptoms. The mentioned study used the Questionnaire for Urinary Incontinence Diagnosis and International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form, which have been designed for detecting only urinary incontinence; however, in the current study, the DIVA questionnaire was used that includes fewer specific questions for this complaint. In contrast, in a survey of 4063 Chinese postmenopausal women, the most common complaints were low sexual interest, vaginal dryness, and urinary incontinence.[23] In a previous study on Turkish women, the most common complaints were vaginal dryness, decreased lubrication, urinary urgency, and urinary incontinence.[21] Furthermore, in another study on European women, the most common GSM symptoms were vaginal dryness and dyspareunia, which were also consistent with the findings of the present study.[24]

In the current study, the most common findings in the clinical examination were the loss of rugae, decreased vaginal moisture, and vaginal paleness. Similarly, a previous study reported that the most common GSM symptoms were a decrease in vaginal lubrication during sexual activity, a reduction of vaginal moisture, and loss of vaginal discharge, which were in line with the findings of the present study.[5]

The findings of the current study showed that the severity of all signs of GSM in the pelvic examination was significantly higher among postmenopausal women with GSM compared to those who did not have GSM. This finding aligns with those of previous studies. In a study, some clinical problems, such as loss of vaginal moisture, elasticity, and rugae have been described for GSM diagnosis.[25] Another study introduced vaginal dryness, reduced lubrication, vaginal vault prolapse, and urethral prolapse as clinical manifestations of GSM.[4] Also, loss of labial and vulval thickness, decreased vaginal elasticity and blood flow, dry and thin vaginal epithelium, and prolapse (vaginal vault, pelvic organs, urethral) were identified as the signs of GSM in earlier evidence.[26]

In the current present study, vaginal atrophy was assessed using the DIVA questionnaire. The results showed that the scores of all domains and the total score of the DIVA questionnaire were significantly higher in participants with GSM. A survey reported that the DIVA questionnaire scores were significantly higher in women diagnosed with GSM than those without GSM.[27] In another study, the total score of DIVA showed women without sexual activity reported more vaginal symptoms compared with sexually active women. In the mentioned report, sexual activity has been considered a signal for better vaginal condition.[28] Another previous study reported a significant relationship between the sexual functions domain of the DIVA questionnaire with the female sexual function score and the female sexual distress score. Also, a significant relationship was reported between bothersome vaginal symptom severity and all of the DIVA domain questionnaires except activities of daily living, which is consistent with the findings of the current study.[15]

In the present study, there was a significant relationship between age and GSM, indicating that the chance of developing GSM increases by 0.06 times for every one-year increase in age. The findings of previous studies regarding the relationship between age and GSM were contradictory. While an earlier cross-sectional study reported a significant relationship between age and genitourinary syndrome, a case-control study conducted on 300 postmenopausal women reported no significant relationship between age and GSM.[7, 24, 29] Evidence supports the association

between ovarian insufficiency and the decrease in estrogen; it appears that the effects of decreased estrogen on the progression of GSM increase over time, which is why symptoms are more prevalent and higher in severity in older women. Also, previous studies confirm that the increased level of GSM with higher age is due to increased co-incidence with other degenerations.[21, 30]

The current study showed a significant relationship between gravida and parity with GSM. Each additional pregnancy was associated with a 17% reduction in the odds of developing the syndrome, which is inconsistent with the findings of previous studies. Two previous studies reported that parity was associated with genitourinary issues, and women with higher parity more frequently suffered from urinary incontinence.[21, 31] Also, in an earlier Turkish study, dysuria and stress incontinence were found to be more common in women who had given birth to more children and in those who had more than three pregnancies, respectively.[32] Contrarily, a Chinese study showed no relationship between the parity and urogenital symptoms of middle-aged females.[7] However, the current study showed a protective effect of parity on GSM. Given the controversy surrounding the evidence, further studies are needed to explore the possible mechanism.

This study also showed that urinary problems were another predictor of GSM. Previous studies have reported similar findings. An Indian study reported GSM was significantly associated with urogynecological conditions like stress incontinence and recurrent urinary infections.[33] Another study reported the high prevalence of urinary problems in a sample of menopausal women with GSM, including increased frequency of micturition and dysuria.[34]

The strengths of the current study were evaluating the effects of menopause using a combination of subjective (DIVA questionnaire) and objective (physical examination) and including a remarkable sample of postmenopausal women from different Comprehensive Health Centers in Gonabad city. The limitation of the present study was collecting data from self-reports that might increase the risk of inaccurate answers, especially to the urogenital complaints and the DIVA questionnaire.

Conclusion

The prevalence of genitourinary syndrome was high among postmenopausal women in Gonabad. According to predictive factors for GSM, including age, gravida, and urinary problems, these factors could be used in the early diagnosis of GSM among at-risk women. The awareness and knowledge of postmenopausal women about GSM and its effects on their individual, marital, and quality of life will be investigated in further studies.

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Authors' Contribution

AM, ZZ, FM, and NB did conceptualization and study design. AM and ZZ carried out data collection. Data management, analysis, and interpretation were done by FM, ZZ, and NB. NB and ZZ prepared the initial manuscript draft. AM, ZZ, FM, and NB conducted critical revisions for important intellectual content. All authors read and approved the final version of the manuscript and take responsibility for the integrity and accuracy of the data analysis. The corresponding author attests that all listed authors meet authorship criteria.

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Conflict of Interest

None declared.

Declaration on the use of AI

The authors of this manuscript declare that no artificial intelligence (AI) was used during the writing process.

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