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Factors associated with quality of life, sleep, and health satisfaction in women with nocturia: a cross-sectional study

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ABSTRACT

Introduction: Nocturia is defined as the number of times urine is passed during the main sleep period. Having woken to pass urine for the first time, each urination must be followed by sleep or the intention to sleep. **Objective:** To investigate factors associated with quality of life, satisfaction with sleep, and health in women with and without nocturia. **Methods:** A cross-sectional study involving women attending urogynecology outpatient clinics in Petrópolis and Niterói, RJ, Brazil. Clinical, sociodemographic, and lifestyle data were collected and a physical exam performed. The ICIQ-OAB questionnaire, supplemented by a Visual Analog Scale (VAS), as well as the STOP-BANG and WHOQOL-BREF questionnaires, was administered. Nocturia was defined as one or more voids (nocturia 1) and two or more voids (nocturia 2). Statistical analysis included logistic regression modeling, Wald significance test, Shapiro-Wilk normality test, and Spearman correlation analysis. **Results:** A total of 131 participants were included. There was a statistically significant association of sensation of incomplete bladder emptying (OR=4.897), multimorbidity (OR=4.621), and the care setting in Petrópolis (OR=0.359) with health satisfaction; caffeine consumption and quality of life (OR=0.994), while sensation of incomplete bladder emptying (OR=2.439) and chronic venous insufficiency (OR=0.437) with sleep satisfaction. The relationship between the number of voids and symptom discomfort was positive for both nocturia 1 and nocturia 2, assessed via numerical scale and VAS. **Conclusion:** Nocturia had a specific impact on quality of life (QoL). Sensation of incomplete bladder emptying was associated with lower health and sleep satisfaction. Multimorbidity was associated with lower health satisfaction.

Keywords: Nocturia; Lower Urinary Tract Symptoms; Quality of Life; Sleep Quality; Women's Health; Multimorbidity.

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INTRODUCTION

Nocturia is defined as the number of times urine is passed during the main sleep period. Having woken to pass urine for the first time, each urination must

be followed by sleep or the intention to sleep[1]. Its etiology is multifactorial, involving cardiovascular, endocrine, renal, urological conditions, sleep disorders, and medications used in their treatment[2].

Women attending urogynecology services have a high prevalence of urinary symptoms and symptom combinations. Particularly, overactive bladder syndrome and underactive bladder syndrome may include the presence of nocturia among their constellation of symptoms.

The first is characterized by urinary urgency, which may be accompanied by incontinence, increased urinary frequency, and nocturia. Underactive bladder syndrome is characterized by a slow urinary stream, hesitation, straining during urination, and a sensation of incomplete bladder emptying, which may include storage phase symptoms such as nocturia. Both syndromes are associated with this symptom through a reduction in bladder capacity[2,3].

The impact of nocturia on quality of life (QoL) has been the subject of several studies. In a study conducted on the general Colombian population regarding the prevalence of nocturia and associated factors, Azuero et al.[4] observed, through the International Consultation on Incontinence Questionnaire Overactive Bladder Module (ICIQ-OAB), that 20.4% of participants who reported three nocturnal voids perceived a severe impairment in QoL.

In Brazil, Soler et al.[5] evaluated the impact of lower urinary tract symptoms (LUTS) on QoL in five capital cities. Greater discomfort with nocturia was associated, in women, with higher odds of reporting their QoL related to LUTS as "terrible" through question number eight of the International Prostate Symptom Score (IPSS).

One of the aspects that deserves emphasis in this relationship is sleep quality. In a study conducted by Choi et al.[6], the presence of two or more nocturnal voids increased the odds of reporting poorer sleep quality. Additionally, participants with poorer sleep quality had worse health-related QoL, including physical aspects and social functioning, as measured by the 12-Item Short Form Health Survey version 2 (SF-12 v2).

Given the wide range of comorbidities associated with nocturia, the negative impact of multimorbidity on QoL deserves emphasis. In a meta-analysis that included four studies, Makovski et al.[7] observed a decline of 4.37% in the physical domain scores and 1.57% in the mental domain scores of the abbreviated version of the World Health Organization Quality of Life questionnaire (WHOQoL-bref) for each additional comorbidity. Due to the high prevalence of multimorbidity in Brazil, it should be considered in studies on the impact of nocturia on QoL[8].

The objectives of this study were to investigate the impact of nocturia on general and specific QoL in women treated at two urogynecology clinics in the state of Rio de Janeiro, as well as the clinical and sociodemographic factors associated with QoL, sleep satisfaction, and health satisfaction.

METHODS

The study consisted of a cross-sectional, observational, individualized, hospital-based survey. The study, titled "Nocturia: etiology and impact on quality of life in users of the Unified Health System" (SUS - Sistema Único de Saúde), was approved by the Research Ethics Committee (REC) of the Faculdade de Medicina of the Universidade Federal Fluminense (approval number 4.812.815), with the consent of the REC of the Centro Universitário Arthur Sá Earp Neto (UNIFASE). All participants signed the Informed Consent Form.

The study candidates were women treated at the urogynecology clinics of Hospital Universitário Antônio Pedro (HUAP) and UNIFASE in 2021 and 2022, and the sample was one of convenience. The inclusion criterion was preserved cognitive capacity. The exclusion criteria were neurological disease, a history of pelvic radiotherapy, surgery for pelvic cancer, age under 18 years, and current pregnancy.

The following sociodemographic data were investigated: age (stratified into three age groups: up to 45 years, 45 to 55 years, and over 55 years; education level (incomplete elementary education and from completed elementary education onwards); and data collection site - Petrópolis and Niterói (cities located in the state of Rio de Janeiro).

Some lifestyle habits were queried and treated as continuous quantitative variables: tobacco consumption, estimated in packs/year, and caffeine consumption, estimated by quantifying the intake of mate tea, coffee, chocolate, soda, and powdered chocolate[9].

As these were urogynecology clinics, special attention was given to pelvic floor dysfunctions (PFD). Nocturia was considered according to two definitions: one or more nocturnal voids (nocturia 1) and two or more nocturnal voids (nocturia 2), the latter based on evidence indicating a greater impact on QoL.

Other LUTS evaluated included slow urinary stream, hesitancy, post-micturition dribble, sensation of incomplete bladder emptying, urgency urinary incontinence (UUI), overactive bladder (OAB) syndrome, and stress urinary incontinence (SUI). Additionally, fecal incontinence, constipation defined by fewer than three bowel movements per week and by the Bristol Stool Scale, and pelvic organ prolapse (POP) were evaluated. The International Continence Society (ICS) standardization of terminology was used in defining LUTS and POP[10,11].

Although the ICS recommends the use of a bladder diary in the assessment of nocturia - an instrument particularly valuable for investigating the underlying pathophysiological mechanisms - nocturia was assessed in the present study through patient

self-report, as was done for the other lower urinary tract symptoms. This decision was based on the authors' experience indicating substantial difficulty among women attending both outpatient clinics in accurately completing the bladder diary, which limits the usefulness of the instrument[12].

The following comorbidities were investigated: systemic arterial hypertension (SAH), heart failure (HF), chronic venous insufficiency (CVI), chronic kidney disease (CKD), history of recurrent urinary tract infection (UTI), and anxiety/depression. Depression and anxiety were addressed together, as many participants were unable to accurately report their diagnosis, and these are often co-occurring conditions[13].

Since the study population had limited access to polysomnography, the risk of obstructive sleep apnea (OSA), a known cause of nocturia, was estimated using the STOP-BANG questionnaire and dichotomized into low and intermediate/elevated risk categories[14].

Considering the profile of patients treated at the data collection sites having a high number of comorbidities, the variable was dichotomized into up to two comorbidities and three or more.

Participants were asked about the use of calcium channel blockers, diuretics, angiotensin II receptor blockers, angiotensin-converting enzyme inhibitors, beta-blockers, insulin, and hypoglycemic agents. Polypharmacy was defined as the simultaneous use of five or more medications[15].

Body mass index (BMI) was stratified into underweight/normal weight, overweight, and obesity categories. The grouping of the first two categories was due to the small number of participants underweight, while overweight and obesity were more relevant for evaluating nocturia[16].

POP was classified according to the Pelvic Organ Prolapse Quantification (POP-Q) system. The anterior, posterior, and apical compartments of POP-Q were stratified into stages up to II and stages III and above[17].

QoL was assessed using the WHOQOL-BREF questionnaire, a simplified version of the World Health Organization questionnaire[18]. Responses to the overall QoL question (Question 1), satisfaction with health (Question 2), and satisfaction with sleep (Question 16) were considered in the analysis.

Self-assessment of QoL was dichotomized into positive (responses "good" and "very good") and negative ("very poor", "poor", and "neither poor nor good"). Responses regarding satisfaction with health and sleep were dichotomized into higher ("satisfied" and "very satisfied") and lower ("very dissatisfied", "dissatisfied", and "neither satisfied nor dissatisfied").

Participants with nocturia 1 completed the ICIQ-OAB questionnaire to assess the specific impact of nocturia on QoL. A visual analog scale (VAS) was added to the specific question about nocturia[19].

Univariate logistic models were adjusted to estimate the odds of participants reporting negative self-assessment of QoL, lower satisfaction with sleep, and lower satisfaction with health. Crude odds ratios were estimated, along with their respective 95% confidence intervals and p-values.

In the multivariate analysis, variables that showed an association with the outcome with a p-value ≤0.20 in the univariate analysis were considered. Variables that maintained a significant association with the outcome with a p-value ≤0.05 were retained in the multivariate analysis. Adjusted odds ratios and their 95% confidence intervals were estimated.

To assess the correlation between the number of nocturia episodes and the numerical scale (question 4-b) of the ICIQ-OAB and VAS, Spearman's correlation coefficient was used after conducting the Shapiro-Wilk normality test.

RESULTS

A total of 131 women were included in the study. The prevalence of nocturia was 71%, with 56.5% of participants experiencing two or more nocturnal voids (Table 1).

Women who reported a sensation of incomplete bladder emptying and those with three or more comorbidities had 4.5 times higher odds of reporting lower satisfaction with health. Additionally, participants who attended in Petrópolis, compared to Niterói, were less likely to report lower satisfaction with health (Table 2).

Regarding the outcome of self-assessment of QoL, caffeine consumption was associated with a 1% reduction in the odds of reporting negative self-assessment of QoL for each one milligram increase in caffeine consumed (Table 3).

Regarding satisfaction with sleep, the presence of sensation of incomplete bladder emptying was associated with 2.4 times higher odds of reporting lower satisfaction. On the other hand, the presence of chronic venous insufficiency was associated with 56.3% lower odds (Table 4).

Regarding the ICIQ-OAB questionnaire, 90 participants with nocturia responded to the numerical scale, of whom 71 reported nocturia 2. The VAS was completed by 89 participants with nocturia and all participants who reported nocturia 2. A positive relationship was observed between the number of nocturia episodes and discomfort with the symptom, both through the numerical scale (Spearman correlation coefficient of 0.437; p<0.001) and the visual analog scale (Spearman correlation coefficient of 0.493; p<0.001).

The relationship was also positive with nocturia 2, with respective Spearman coefficients and p-values: 0.367 (p=0.002) and 0.468 (p<0.001). It is worth mentioning that, according to the Shapiro-Wilk test, all variables involved in the Spearman correlation analysis did not have normal distributions (p<0.001).

Table 1: Descriptive analysis of sociodemographic and clinical characteristics of women treated at two urogynecology clinics (n=131). Niterói (RJ) and Petrópolis (RJ), 2021-2022.

Characteristics		% of patients (n=131)	Health satisfaction		Sleep satisfaction		Self-rated quality of life	
		or mean ±SD	Higher (n=34)	Lower (n=97)	Higher n=52)	Lower (n=79)	Positive (n=82)	Negative (n=49)
Location	Niterói	45 (34.4%)	15.6	84.4	42.2	57.8	68.9	31.1
	Petrópolis	86 (65.6%)	31.4	68.6	38.4	61.6	59.3	40.7
Age	Up to 45 years	16 (12.2%)	43.8	56.2	37.5	62.5	62.5	37.5
	45 to 55 years	33 (25.2%)	18.2	81.8	24.2	75.8	57.6	42.4
	Over 55 years	82 (62.6%)	25.6	74.4	46.3	53.7	64.6	35.4
Education	Up to incomplete elementary education	60 (45.8%)	25.0	75.0	43.3	56.7	60.0	40.0
	At least completed elementary education	71 (54.2%)	26.8	73.2	36.6	63.4	64.8	35.2
Hesitation	Absent	116 (88.5%)	26.7	73.3	39.7	60.3	62.1	37.9
	Present	15 (11.5%)	20.0	80.0	40.0	60.0	66.7	33.3
Slow stream	Absent	108 (82.4%)	27.8	72.2	38.9	61.1	63.9	36.1
	Present	23 (17.6%)	17.4	82.6	43.5	56.5	56.5	43.5
Incomplete bladder emptying sensation	Absent	58 (44.3%)	37.9	62.1	51.7	48.3	69.0	31.0
	Present	73 (55.7%)	16.4	83.6	30.1	69.9	57.5	42.5
Post-micturition dribble	Absent	89 (67.9%)	30.3	69.7	46.1	53.9	67.4	32.6
	Present	42 (32.1%)	16.7	83.3	26.2	73.8	52.4	47.6
Pelvic organ prolapse (symptom)	Absent	89 (67.9%)	31.5	68.5	39.3	60.7	60.7	39.3
	Present	42 (32.1%)	14.3	85.7	40.5	59.5	66.7	33.3
Anterior vaginal wall prolapse	Up to Stage II	117 (89.3%)	25.6	74.4	38.5	61.5	61.5	38.5
	Stage III or IV	14 (10.7%)	28.6	71.4	50.0	50.0	71.4	28.6
Posterior vaginal wall prolapse	Up to Stage II	128 (97.7%)	26.6	73.4	39.8	60.2	62.5	37.5
	Stage III or IV	3 (2.3%)	0	100	33.3	66.7	66.7	33.3
Apical prolapse	Stage III or IV	128 (97.7%)	25.8	74.2	39.8	60.2	62.5	37.5
	Up to Stage II	3 (2.3%)	33.3	66.7	33.3	66.7	66.7	33.3
Fecal Incontinence	Absent	122 (93.1%)	26.2	73.8	39.3	60.7	61.5	38.5
	Present	9 (6.9%)	22.2	77.8	44.4	55.6	77.8	22.2
Constipation (Bristol)	Absent	105 (80.2%)	28.6	71.4	41.0	59.0	65.7	34.3
	Present	26 (19.8%)	15.4	84.6	34.6	65.4	50.0	50.0
Constipation (frequency)	Absent	103 (78.6%)	24.3	75.7	38.8	61.2	62.1	37.9
	Present	28 (21.4%)	32.1	67.9	42.9	57.1	64.3	35.7
Recurrent UTI	Absent	114 (87.0%)	28.1	71.9	42.1	57.9	64.0	36.0
	Present	17 (13.0%)	11.8	88.2	23.5	76.5	52.9	47.1
Systemic arterial hypertension	Absent	54 (41.2%)	35.2	64.8	40.7	59.3	64.8	35.2
	Present	77 (58.8%)	19.5	80.5	39.0	61.0	61.0	39.0
Diabetes mellitus	Absent	92 (70.2%)	30.4	69.6	42.4	57.6	63.0	37.0
	Present	39 (29.8%)	15.4	84.6	33.3	66.7	61.5	38.5
Heart failure	Absent	129 (98.5%)	26.4	73.6	40.3	59.7	62.8	37.2
	Present	2 (1.5%)	0	100	0	100	50.0	50.0
Chronic kidney disease	Absent	128 (97.7%)	26.6	73.4	40.6	59.4	63.3	36.7
	Present	3 (2.3%)	0	100	0	100	33.3	66.7
Chronic venous insufficiency	Absent	88 (67.2%)	27.3	72.7	33.0	67.0	60.2	39.8
	Present	43 (32.8%)	23.3	76.7	53.5	46.5	67.4	32.6

It continues...

Table 1: Continuation.

Characteristics		% of patients (n=131)	Health satisfaction		Sleep satisfaction		Self-rated quality of life	
		or mean ±SD	Higher (n=34)	Lower (n=97)	Higher n=52)	Lower (n=79)	Positive (n=82)	Negative (n=49)
Depression/ Anxiety	Absent	113 (86.3%)	28.3	71.7	40.7	59.3	61.9	38.1
	Present	18 (13.7%)	11.1	88.9	33.3	66.7	66.7	33.3
Number of comorbidities	Up to 2	44 (33.6%)	40.9	59.1	43.2	56.8	63.6	36.4
	3 or more	87 (66.4%)	18.4	81.6	37.9	62.1	62.1	37.9
Antidepressant	Absent	105 (80.2%)	28.6	71.4	40.0	60.0	60.0	40.0
	Present	26 (19.8%)	15.4	84.6	38.5	61.5	73.1	26.9
Diuretic	Absent	92 (70.2%)	30.4	69.6	40.2	59.8	58.7	41.3
	Present	39 (29.8%)	15.4	84.6	38.5	61.5	71.8	28.2
Calcium channel blocker	Absent	108 (82.4%)	27.8	72.2	39.8	60.2	63.0	37.0
	Present	23 (17.6%)	17.4	82.6	39.1	60.9	60.9	39.1
Benzodiazepine	Absent	117 (89.3%)	29.1	70.9	39.3	60.7	64.1	35.9
	Present	14 (10.7%)	0	100	42.9	57.1	50.0	50.0
Angiotensin II receptor blocker	Absent	73 (55.7%)	31.5	68.5	42.5	57.5	58.9	41.1
	Present	58 (44.3%)	19.0	81.0	36.2	63.8	67.2	32.8
Beta-Blocker	Absent	109 (83.2%)	27.5	72.5	39.4	60.6	63.3	36.7
	Present	22 (16.8%)	18.2	81.8	40.9	59.1	59.1	40.9
Hypoglycemic Agent	Absent	93 (71.0%)	30.1	69.9	41.9	58.1	60.2	39.8
	Present	38 (29.0%)	15.8	84.2	34.2	65.8	68.4	31.6
Insulin	Absent	124 (94.7%)	26.6	73.4	37.9	62.1	62.9	37.1
	Present	7 (5.3%)	14.3	85.7	71.4	28.6	57.1	42.9
Angiotensin-converting enzyme inhibitor	Absent	124 (94.7%)	25.8	74.2	39.5	60.5	62.9	37.1
	Present	7 (5.3%)	28.6	71.4	42.9	57.1	57.1	42.9
Polypharmacy	Fewer than 4 medications	89 (67.9%)	31.5	68.5	38.2	61.8	62.9	37.1
	5 or more medications	42 (32.1%)	14.3	85.7	42.9	57.1	61.9	38.1
Body mass index	Underweight / Normal	28 (21.4%)	39.3	60.7	39.3	60.7	71.4	28.6
	Overweight	75 (57.3%)	21.3	78.7	44.0	56.0	61.3	38.7
	Obesity	28 (21.4%)	25.0	75.0	28.6	71.4	57.1	42.9
Risk of OSA	Low	54 (41.2%)	37.0	63.0	46.3	53.7	59.3	40.7
	Moderate/High	77 (58.8%)	18.2	81.8	35.1	64.9	64.9	35.1
Nocturia (Definition 1)	No micturition	38 (29.0%)	26.3	73.7	50.0	50.0	57.9	42.1
	One or more	93 (71.0%)	25.8	74.2	35.5	64.5	64.5	35.5
Nocturia (Definition 2)	Up to one micturition	57 (43.5%)	26.3	73.7	42.1	57.9	59.6	40.4
	Two or more	74 (56.5%)	25.7	74.3	37.8	62.2	64.9	35.1
Stress urinary incontinence	Absent	108 (82.4%)	25.9	74.1	39.8	60.2	61.1	38.9
	Present	23 (17.6%)	26.1	73.9	39.1	60.9	69.6	30.4
Urgency urinary incontinence	Absent	114 (87.0%)	24.6	75.4	39.5	60.5	61.4	38.6
	Present	17 (13.0%)	35.3	64.7	41.2	58.8	70.6	29.4
Mixed urinary incontinence	Absent	58 (44.3%)	29.3	70.7	44.8	55.2	63.8	36.2
	Present	73 (55.7%)	23.3	76.7	35.6	64.4	61.6	38.4
Overactive bladder syndrome	Absent	35 (26.7%)	28.6	71.4	48.6	51.4	60.0	40.0
	Present	96 (73.3%)	25.0	75.0	36.5	63.5	63.5	36.5
Caffeine (mg/day)		163.6±78.0	179.0±74.3	158.0±78.8	163.0±80.7	164.0±76.6	177.0±69.3	142.0±87.0
Tobacco (packs/year)		4.4±13.6	4.3±12.0	4.4±14.1	7.3±19.7	2.5±6.8	4.9±12.2	3.5±15.7

Table 2: Association between sociodemographic and clinical characteristics and the odds of lower satisfaction with health among women treated at two urogynecology clinics (n=131). Niterói (RJ) and Petrópolis (RJ), 2021-2022.

Characteristics	Univariate logistic models			Multivariate logistic model			Selected logistic model		
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
Location: Petrópolis vs Niterói	0.403	0.159; 1.016	0.054	0.433	0.127; 1.479	0.182	0.359	0.130; 0.991	0.048
Age			0.173			0.079			
Age: Over 55 years vs Up to 45 years	2.259	0.748; 6.823	0.148	0.500	0.083; 3.012	0.449			
Age: 45 to 55 years vs Up to 45 years	3.500	0.929; 13.180	0.064	2.803	0.507; 15.485	0.237			
Education: Completed elementary education or more vs Up to incomplete elementary education	0.912	0.416; 2.002	0.819						
Hesitation: Present vs Absent	1.459	0.386; 5.518	0.578						
Slow Stream: Present vs Absent	1.827	0.574; 5.813	0.308						
Incomplete bladder emptying sensation: Present vs Absent	3.106	1.375; 7.019	0.006	4.767	1.550; 14.659	0.006	4.897	1.896; 12.648	0.001
Post-micturition dribble: Present vs Absent	2.177	0.860; 5.512	0.101	2.023	0.567; 7.213	0.278			
POP[1] (symptom) Present vs Absent	2.754	1.041; 7.288	0.041	4.844	1.345; 17.448	0.016			
AVP[2]: Stage III or IV vs Up to Stage II	0.862	0.252; 2.954	0.813						
Apical Prolapse: Stage III or IV vs Up to Stage II	0.695	0.061; 7.914	0.769						
Fecal Incontinence: Present vs Absent	1.244	0.246; 6.304	0.792						
Constipation (Bristol): Present vs Absent	2.200	0.699; 6.923	0.178	1.847	0.442; 7.718	0.400			
Constipation (Frequency): Present vs Absent	0.677	0.272; 1.685	0.401						
Recurrent UTI[3]: Present vs Absent	2.927	0.633; 13.529	0.169	2.384	0.299; 19.021	0.412			
SAH[4]: Present vs Absent	2.244	1.015; 4.962	0.046	1.755	0.278; 11.093	0.550			
DM[5]: Present vs Absent	2.406	0.906; 6.390	0.078	6.018	0.125; 289.810	0.364			
Chronic Venous Insufficiency: Present vs Absent	1.238	0.530; 2.892	0.623						
Depression/Anxiety: Present vs Absent	3.160	0.687; 14.535	0.139	3.807	0.373; 38.824	0.259			
Number of comorbidities: Three or more vs Up to two	3.072	1.367; 6.903	0.007	3.071	0.739; 12.757	0.123	4.621	1.807; 11.821	0.001
Antidepressant: Present vs Absent	2.200	0.699; 6.923	0.178	0.564	0.074; 4.281	0.580			
Diuretic: Present vs Absent	2.406	0.906;6.390	0.078	1.374	0.298; 6.330	0.683			
Calcium channel blocker: Present vs Absent	1.827	0.574; 5.813	0.308						
ARB[6]: Present vs Absent	1.965	0.864; 4.469	0.107	0.698	0.121; 4.015	0.687			
Beta-Blocker: Present vs Absent	1.709	0.535; 5.463	0.366						
Hypoglycemic agent: Present vs Absent	2.297	0.864; 6.109	0.096	0.675	0.013; 35.205	0.845			
Insulin: Present vs Absent	2.176	0.252; 18.757	0.479						
ACE inhibitor [7]: Present vs Absent	0.870	0.161; 4.705	0.871						
Polypharmacy: Five or more medications vs Fewer than four medications	2.754	1.041; 7.288	0.041	1.200	0.258; 5.577	0.816			
BMI[8]			0.189			0.416			
BMI: Overweight vs Normal BMI	2.386	0.934; 6.098	0.069	2.602	0.643; 10.524	0.180			
BMI: Obesity vs Normal BMI	1.941	0.619; 6.089	0.255	2.282	0.371; 14.048	0.374			
Risk of OSA[9]: Moderate/High vs Low	2.647	1.189; 5.893	0.017	1,123	0.315; 4.005	0.858			
Nocturia 1: One or more vs No micturition	1.027	0.435; 2.423	0.952						
Nocturia 2: Two or more vs Up to one micturition	1.034	0.471; 2.271	0.934						
SUI[10]: Present vs Absent	0.992	0.356; 2.765	0.987						
UUI[11]: Present vs Absent	0.597	0.202; 1.762	0.350						
MUI[12]: Present vs Absent	1.366	0.624; 2.991	0.436						
OAB[13]: Present vs Absent	1.200	0.504; 2.855	0.680						
Caffeine (mg/day)	0.996	0.991; 1.002	0.170	0.997	0.990; 1.003	0.288			
Tobacco (packs/year)	1.000	0.972; 1.030	0.974						

[1]POP: Pelvic Organ Prolapse; [2]AVP: Anterior Vaginal Wall Prolapse; [3]UTI: Urinary Tract Infection; [4]SAH: Systemic Arterial Hypertension; [5]DM: Diabetes Mellitus; [6]ARB: Angiotensin II Receptor Blocker; [7]ACE inhibitor: Angiotensin-Converting Enzyme Inhibitor; [8]BMI: Body Mass Index; [9]OSA: Obstructive Sleep Apnea; [10]SUI: Stress Urinary Incontinence; [11]UUI: Urgency Urinary Incontinence; [12]MUI: Mixed Urinary Incontinence; [13]OAB: Overactive Bladder Syndrome.

Table 3: Association between sociodemographic and clinical characteristics and the odds of negative self-assessment of quality of life among women treated at two urogynecology clinics (n=131). Niterói (RJ) and Petrópolis (RJ), 2021-2022.

Characteristics	Univariate logistic models			Multivariate logistic model			Selected logistic model		
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
Location: Petrópolis vs Niterói	1.520	0.708; 3.262	0.283						
Age			0.779						
Age: Over 55 years vs Up to 45 years	0.912	0.301; 2.764	0.871						
Age: 45 to 55 years vs Up to 45 years	1.228	0.361; 4.181	0.742						
Education: Completed elementary education or more vs Up to incomplete elementary education	0.815	0.401; 1.658	0.573						
Hesitation: Present vs Absent	0.818	0.262; 2.551	0.729						
Slow Stream: Present vs Absent	1.361	0.546; 3.392	0.508						
Incomplete bladder emptying sensation: Present vs Absent	1.640	0.795; 3.385	0.181	1.572	0.718;3.442	0.257			
Post-micturition dribble: Present vs Absent	1.881	0.888; 3.984	0.099	2.028	0.900;4.570	0.088			
POP[1] (symptom) Present vs Absent	0.771	0.357; 1.666	0.509						
AVP[2]: Stage III or IV vs Up to Stage II	0.640	0.189; 2.163	0.473						
PVP[3]: Stage III or IV vs Up to Stage II	0.833	0.074; 9.437	0.883						
Apical Prolapse: Stage III or IV vs Up to Stage II	0.833	0.074; 9.437	0.883						
Fecal Incontinence: Present vs Absent	0.456	0.091; 2.288	0.340						
Constipation (Bristol): Present vs Absent	1.917	0.805; 4.566	0.142	2.399	0.937;6.144	0.068			
Constipation (Frequency): Present vs Absent	0.912	0.382; 2.175	0.835						
Recurrent UTI[4]: Present vs Absent	1.583	0.567; 4.417	0.381						
SAH[5]: Present vs Absent	1.176	0.571; 2.421	0.660						
DM[6]: Present vs Absent	1.066	0.493; 2.306	0.871						
HF[7]: Present vs Absent	1.687	0.103; 27.604	0.714						
CKD[8]: Present vs Absent	3.447	0.304; 39.043	0.318						
CVI[9]: Present vs Absent	0.731	0.339; 1.575	0.424						
Depression/Anxiety: Present vs Absent	0.814	0.285; 2.328	0.701						
Number of comorbidities: Three or more vs Up to two	1.069	0.504; 2.268	0.861						
Antidepressant: Present vs Absent	0.553	0.214; 1.430	0.221						
Diuretic: Present vs Absent	0.558	0.248; 1.257	0.159	0.432	0.179;1.040	0.061			
Calcium channel blocker: Present vs Absent	1.093	0.434; 2.753	0.851						
Benzodiazepine: Present vs Absent	1.786	0.586; 5.438	0.308						
ARB[10]: Present vs Absent	0.698	0.340; 1.434	0.328						
Beta-Blocker: Present vs Absent	1.194	0.469; 3.042	0.710						
Hypoglycemic agent: Present vs Absent	0.699	0.314; 1.555	0.380						
Insulin: Present vs Absent	1.272	0.272; 5.936	0.760						
ACE inhibitor[11]: Present vs Absent	1.272	0.272; 5.936	0.760						
Polypharmacy: Five or more medications vs Fewer than four medications	1.044	0.490; 2.226	0.911						
BMI[12]			0.516						
BMI: Overweight vs Normal BMI	1.576	0.614; 4.045	0.344						
BMI: Obesity vs Normal BMI	1.875	0.618; 5.690	0.267						
Risk of OSA[13]: Moderate/High vs Low	0.785	0.384; 1.608	0.509						
Nocturia 1: One or more vs No micturition	0.756	0.350; 1.636	0.478						
Nocturia 2: Two or more vs Up to one micturition	0.801	0.393; 1.633	0.541						
SUI[14]: Present vs Absent	0.688	0.261; 1.811	0.448						
UUI[15]: Present vs Absent	0.663	0.219; 2.010	0.468						
MUI[16]: Present vs Absent	1.096	0.537; 2.238	0.801						
OAB [17]: Present vs Absent	0.861	0.389; 1.904	0.711						
Caffeine (mg/day)	0.994	0.989; 0.999	0.014	0.993	0.988;0.998	0.007	0.994	.989;0.999	0.014
Tobacco (packs/year)	0.991	0.963; 1.021	0.557						

[1]POP: Pelvic Organ Prolapse; [2]AVP: Anterior Vaginal Wall Prolapse; [3]PVP: Posterior Vaginal Wall Prolapse; [4]UTI: Urinary Tract Infection; [5]SAH: Systemic Arterial Hypertension; [6]DM: Diabetes Mellitus; [7]HC: Heart failure; [8]CKD: Chronic kidney disease; [9]CVI: Chronic venous insufficiency; [10]ARB: Angiotensin II Receptor Blocker; [11]ACE inhibitor: Angiotensin-Converting Enzyme Inhibitor; [12]BMI: Body Mass Index; [13]OSA: Obstructive Sleep Apnea; [14]SUI: Stress Urinary Incontinence; [15]UUI: Urgency Urinary Incontinence; [16]MUI: Mixed Urinary Incontinence; [17]OAB: Overactive Bladder Syndrome.

Table 4: Association between sociodemographic and clinical characteristics and the odds of lower satisfaction with sleep among women treated at two urogynecology clinics (n=131). Niterói (RJ) and Petrópolis (RJ), 2021-2022.

Characteristics	Univariate logistic models			Multivariate logistic model			Selected logistic model		p-value
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	
Location: Petrópolis vs Niterói	1.174	0.563; 2.445	0.669						
Age			0.097			0.528			
Age: Over 55 years vs Up to 45 years	0.695	0.231; 2.090	0.517	0.786	0,219; 2,816	0,711			
Age: 45 to 55 years vs Up to 45 years	1.875	0.517; 6.796	0.339	1.392	0.335; 5.785	0.649			
Education: Completed elementary education or more vs Up to incomplete elementary education	1.324	0.655; 2.673	0.434						
Hesitation: Present vs Absent	0.986	0.329; 2.955	0.980						
Slow Stream: Present vs Absent	0.827	0.333; 2.057	0.683						
Incomplete bladder emptying sensation: Present vs Absent	2.484	1.212; 5.091	0.013	2.255	1.005; 5.061	0.049	2.439	1.174; 5.067	0.017
Post-micturition dribble: Present vs Absent	2.407	1.077; 5.380	0.032	1.703	0.667; 4.349	0.266			
POP[1] (symptom) Present vs Absent	0.953	0.451; 2.015	0.900						
AVP[2]: Stage III or IV vs Up to Stage II	0.625	0.206; 1.900	0.407						
PVP[3]: Stage III or IV vs Up to Stage II	1.325	0.117; 14.993	0.820						
Apical Prolapse: Stage III or IV vs Up to Stage II	1.325	0.117; 14.993	0.820						
Fecal Incontinence: Present vs Absent	0.811	0.207; 3.172	0.763						
Constipation (Bristol): Present vs Absent	1.310	0.534; 3.212	0.555						
Constipation (Frequency): Present vs Absent	0.847	0.363; 1.975	0.700						
Recurrent UTI[4]: Present vs Absent	2.364	0.726; 7.698	0.153	2.400	0.633; 9.105	0.198			
SAH[5]: Present vs Absent	1.077	0.529; 2.191	0.838						
DM[6]: Present vs Absent	1.472	0.672; 3.222	0.334						
CVI[7]: Present vs Absent	0.427	0.203; 0.901	0.026	0.381	0.155; 0.936	0.035	0.437	0.203; 0.937	0.034
Depression/Anxiety: Present vs Absent	1.373	0.481; 3.922	0.554						
Number of comorbidities: Three or more vs Up to two	1.244	0.595; 2.599	0.562						
Antidepressant: Present vs Absent	1.067	0.442; 2.575	0.886						
Diuretic: Present vs Absent	1.076	0.499; 2.320	0.851						
Calcium channel blocker: Present vs Absent	1.029	0.409; 2.587	0.951						
Benzodiazepine: Present vs Absent	0.864	0.281; 2.652	0.798						
ARB[8]: Present vs Absent	1.300	0.640; 2.641	0.467						
Beta-Blocker: Present vs Absent	0.941	0.370; 2.392	0.898						
Hypoglycemic agent: Present vs Absent	1.389	0.632; 3.050	0.413						
Insulin: Present vs Absent	0.244	0.046; 1.309	0.100	0.216	0.032; 1.467	0.117			
ACE inhibitor[9]: Present vs Absent	0.871	0.187; 4.062	0.861						
Polypharmacy: Five or more medications vs Fewer than four medications	0.824	0.391; 1.738	0.612						
BMI [10]			0.369						
BMI: Overweight vs Normal BMI	0.824	0.340; 1.995	0.667						
BMI: Obesity vs Normal BMI	1.618	0.529; 4.942	0.399						
Risk of OSA[11]: Moderate/High vs Low	1.596	0.784; 3.250	0.197	2.076	0.855; 5.043	0.106			
Nocturia 1: One or more vs No micturition	1.818	0.846; 3.906	0.125	1.608	0.671; 3.853	0.287			
Nocturia 2: Two or more vs Up to one micturition	1.195	0.590; 2.418	0.621						
SUI[12]: Present vs Absent	1.029	0.409; 2.587	0.951						
UUI[13]: Present vs Absent	0.932	0.331; 2.626	0.894						
MUI[14]: Present vs Absent	1.469	0.726; 2.973	0.285						
OAB [15]: Present vs Absent	1.646	0.753; 3.599	0.212						
Caffeine (mg/day)	1.000	0.996; 1.005	0.903						
Tobacco (packs/year)	0.971	0.939; 1.004	0.080	0.971	0.935; 1.009	0.130			

[1]POP: Pelvic Organ Prolapse; [2]AVP: Anterior Vaginal Wall Prolapse; [3]PVP: Posterior Vaginal Wall Prolapse; [4]UTI: Urinary Tract Infection; [5]SAH: Systemic Arterial Hypertension; [6]DM: Diabetes Mellitus; [7]CVI: Chronic venous insufficiency; [8]ARB: Angiotensin II Receptor Blocker; [9]ACE inhibitor: Angiotensin-Converting Enzyme Inhibitor; [10]BMI: Body Mass Index; [11]OSA: Obstructive Sleep Apnea; [12]SUI: Stress Urinary Incontinence; [13]UUI: Urgency Urinary Incontinence; [14]MUI: Mixed Urinary Incontinence; [15]OAB: Overactive Bladder Syndrome.

DISCUSSION

The presence of a sensation of incomplete bladder emptying was associated with a 4.5 times higher odds of reporting reduced health satisfaction. No association was found between nocturia and the outcome.

Maserejian et al.[20] conducted a study on the general population of the USA, evaluating the prevalence of post-micturition symptoms, their association with other urinary symptoms, and health-related quality of life (HRQoL). Women with post-micturition symptoms exhibited worse physical health scores and greater interference in activities compared to those without the symptoms, using the 12-Item Short-Form Health Survey (SF-12), even after adjusting the statistical model for other isolated urinary symptoms. These results corroborate the findings of the present study.

Another variable associated with increased odds of reporting lower health satisfaction was the presence of three or more comorbidities compared to having up to two comorbidities. Makovski et al.[7], in a meta-analysis of four studies that also used the WHOQoL-BREF to evaluate the association between the number of comorbidities and quality of life (QoL), identified a 4.37% decline in physical domain scores and a 1.57% decline in mental domain scores for each additional comorbidity.

A comprehensive understanding of the association between residing in the city of Petrópolis and the lower likelihood, compared with living in Niterói, of reporting poorer health satisfaction would require the investigation of a range of variables beyond the scope of the present study, including environmental and socioeconomic factors, as well as potential differences in access to health care services between the two cities[21].

Regarding QoL, caffeine consumption exhibited a protective effect, such that each additional milligram consumed reduced the odds of reporting worse QoL by approximately 1%. Although some evidence suggests that caffeine may exacerbate certain urinary symptoms, such as urgency, it is also known that the substance has a range of beneficial effects, including serving as an adjunct in pain management.

Considering that the participants in the present study consumed an average of 163.6 mg/day, and the European Food Safety Authority considers a consumption of up to 400 mg/day safe for adults, the overall effects of caffeine may have outweighed any potential adverse impact on urinary symptoms in quality of life[22,23]. Caffeine consumption does not need to be contraindicated for patients with nocturia. A modest intake of the substance may improve self-perception of quality of life, provided there are no contraindications.

In the analysis of sleep satisfaction, the sensation of incomplete bladder emptying was associated with lower satisfaction. This relationship may be mediated by nocturia, which, although not found to be associated with the outcome in the present study, increased the odds of poorer sleep quality twofold in the work conducted by Choi et al.[6]. Nocturia can be present in both hypoactive bladder syndrome and hyperactive bladder syndrome. A single patient may even exhibit both syndromes concurrently[3].

The presence of chronic venous insufficiency, contrary to expectations, was found to confer protection against lower sleep satisfaction. Chronic venous insufficiency is one of the comorbidities that contributes to nocturia due to increased venous return when in a supine position. Yeldan et al.[24] observed a positive correlation between the severity of chronic venous insufficiency and poorer sleep quality (assessed by the Venous Clinical Severity Score and the Pittsburgh Sleep Quality Index, respectively). In addition, the present study did not classify participants according to the severity of the condition, nor did it include physical activity among the independent variables—one of the behavioral measures recommended for patients with chronic venous insufficiency to alleviate symptoms, which also independently affects sleep quality.

Finally, a positive correlation was observed between the number of voids and both the numerical and visual analog scales of discomfort with the symptom. Consistent with this, Azuero et al.[4] identified severe impairment in quality of life (QoL) in 20.4% of participants who reported three voids, compared to 3.4% and 0.5% among those with one and two voids, respectively. Therefore, nocturia has a specific impact on QoL.

The relevance of this work lies in the limited number of studies that have assessed LUTS in the state of Rio de Janeiro and among populations attending urogynecology clinics. Additionally, the number of clinical, sociodemographic, and behavioral factors studied is noteworthy.

Several limitations of the study need to be addressed. Since the sampling was convenience-based within urogynecology clinics, the prevalence of LUTS in this sample may be higher than that in the general population. It was not possible to study potential associations involving postmenopausal atrophy as a variable, as a significant percentage of participants had a history of hysterectomy, making it difficult to determine the precise onset of menopause.

The comorbidities assessed were those reported by the patients, which may have affected their prevalence. Chronic kidney disease in its initial stages could not be diagnosed, nor could the status of diabetes compensation be classified for participants with diabetes, both conditions being known to be associated with nocturia.

Conclusion

The sensation of incomplete bladder emptying was associated with lower health and sleep satisfaction, highlighting its importance in the overall assessment of older women in clinical settings and in future research involving LUTS.

Multimorbidity was associated with lower health satisfaction, and the mediators of this relationship need to be studied, given the increasing prevalence that accompanies population aging.

Although nocturia did not show a general impact on self-perceived quality of life (QoL) or satisfaction with health and sleep, it did present a specific impact on QoL.

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