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Factors associated with overactive bladder syndrome in the elderly community: a cross-sectional study

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Abstract

Objective: to identify risk factors related to overactive bladder syndrome. **Method:** a cross-sectional study was performed with elderly women (>60 years) from the community of Ceilândia, in the Distrito Federal, Brazil, with or without symptoms of OBS, who were evaluated through interviews and questionnaires. The clinical and sociodemographic variables analyzed were: age; body mass index (BMI); parity, schooling, previous abdominal and urogynecologic surgeries, physical activity, smoking, constipation, systemic arterial hypertension (SAH), diabetes mellitus; depression and anxiety. The questionnaires applied were the Overactive Bladder Awareness Tool (OAB-V8), the Geriatric Depression Scale and the Beck Anxiety Scale. Data were analyzed descriptively. Binary logistic regression was used to evaluate the significant associations between the independent variables and the outcome of interest. Risk ratios were calculated for each independent variable with 95% confidence intervals. **Result:** A total of 372 volunteers were recruited, 292 of whom were eligible. Of these, 172 were allocated to the case group (58.9%) and 120 (41.1%) were control subjects. The two groups were homogeneous between one another. There was a high prevalence of OBS in the study population and significant differences for the variables presence of SAH, abdominal surgery and pelvic surgery, with the case group presenting a higher frequency of these events. In multivariate analysis, it was observed that an active sexual life reduces the chance of having OBS by 70.8%, while urogynecologic surgeries increase this risk 3.098 times. **Conclusion:** In univariate logistic regression analysis, BMI, SAH, a previous history of abdominal and urogynecologic surgery, number of abortions and the presence of symptoms of depression and anxiety, were found to be factors associated with OBS.

Keywords: Urinary Bladder, Overactive. Risk Factors. Elderly. Urinary Incontinence, Urge.

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INTRODUCTION

Overactive Bladder Syndrome (OBS) is characterized by micturition urgency with or without incontinence, polyuria and nocturia, in the absence of other local pathologies¹. Its diagnosis is clinical, is evidenced by the presence of the defining symptoms of the condition, and does not involve the use of invasive examinations². The syndrome has a negative impact on quality of life (QOL)³ and is associated with high economic costs⁴. It results in social, psychological, emotional, physical and sexual difficulties and is considered a serious health problem which mainly affects elderly women^{5,6}.

It is estimated that by 2018 more than 500 million individuals worldwide will suffer from this disorder⁷. North American epidemiological data indicate a prevalence of 16% among the population of that continent⁸, while for Brazil the estimate is 18%⁷. Little is known, however, about the factors associated with OBS and its prevalence among elderly Brazilian women⁹.

While population-based studies have been conducted in a number of countries to estimate the prevalence and risk factors of OBS, the comparison of results is difficult because of the methodological diversity these works employ and their conflicting results¹⁰⁻¹². More accurate knowledge on the subject in question is therefore necessary, with risk groups delimited in a more efficient manner.

In view of the above, the present study aims to identify factors associated with the occurrence of OBS in elderly women living in the community.

METHOD

A cross-sectional study was performed, with the sample group recruited from the activities of the "Escola de Avós" (Grandmother's School) health promotion program, organized by the Health Center for the Elderly of the Primary Health Care Subsecretariat, which takes place in a fire station in the city of Ceilândia, in the Distrito Federal, Brazil. A sample calculation was performed based on the total number of elderly residents in this city (29,168). A sample error of 5% was considered and 95% was adopted as the confidence level, resulting

in a required sample size of 118 individuals for each group¹³.

The eligibility criteria were: female participants, aged 60 years or older, with or without overactive bladder symptoms, such as: urgency; and/or urge incontinence; and/or polyuria; and/or nocturia; which were evaluated through questionnaires. Older women with a history of neurological diseases (Multiple Sclerosis, Alzheimer's Disease, Vascular Brain Accident, Parkinson's Disease and/or spinal cord injury); bladder cancer; psychological disturbances or the inability to respond to questionnaires were excluded.

The elderly women underwent an interview to obtain the clinical and sociodemographic variable data. The following information was collected: age; BMI; parity (gestations, vaginal deliveries, cesarean deliveries and abortions), schooling, previous abdominal and urogynecologic surgeries, physical activity, smoking, constipation, systemic arterial hypertension (SAH), diabetes mellitus; depression and anxiety.

They were then divided into two groups: case and control. The groups were divided using the Overactive Bladder Awareness Tool (OAB-V8), an instrument developed to evaluate OBS symptoms. This consists of eight questions related to increased urinary frequency, nocturia, micturition urgency, urinary incontinence, urge incontinence and enuresis, with domains from 0 to 5, where 0 equals none, 1 almost none, 2 a little, 3 some, 4 a lot and 5 very much. If the sum of the answers is equal to or greater than 8 points there is a probable diagnosis of OBS¹⁴.

Following the interview and due completion of the questionnaires, the total points of the questionnaire were used to divide the sample into two groups: one for elderly women with OBS and one for elderly women without OBS, according to the lower urinary tract infection identified by OAB-V8. Women who scored less than 8 in their final OAB-V8 result were classified as the control group, while a score equal to or greater than 8 meant the participant was placed in the case group. The reduced Yesavage version of the Geriatric Depression Scale (GDS-15)¹⁵ was used for the identification of depressive symptoms in the sample, while anxiety symptoms were evaluated using the Beck Anxiety Scale (BAS)¹⁶.

Interviewers were trained so that each interviewer repeated the question at most three times, if necessary, with no extra explanation during the administration of the questionnaire that might interfere with the participant's interpretation. All the data, from each participant, was collected in a single meeting with an average duration of 30 minutes. Questionnaires were chosen as this strategy provides access to the subjective views of individuals regarding their condition, as well as being an inexpensive and non-invasive method.

The data were analyzed descriptively. Non-normal distribution of data was confirmed using the Kolmogorov-Smirnov test. The differences in the continuous data of the study subgroups defined according to the presence of overactive bladder as *elderly women with* versus *elderly women without* were analyzed using the Mann Whitney U test for independent samples, while the chi-squared test (X^2) was used for the categorical data. The confidence intervals for the mean of the difference between the continuous data of the groups were calculated.

Binary logistic regression analysis was used to evaluate the significant associations between the independent variables and the outcome of interest (OBS). Firstly, univariate logistic regression analysis was used to determine the association between each independent variable and the dependent variable presence of an overactive bladder, thereby verifying the factors that contributed to the occurrence of this syndrome. The risk ratios (RR) were calculated for each independent (explanatory) variable with 95% confidence intervals.

Subsequently, the variables that presented an association with a p -value lower than 0.20 in univariate regression analysis were included in multivariate logistic regression analysis to investigate the independent effect, when taken together, of these variables, for the explanation of "OBS". The selection of the best model was performed with the reduction of variables procedure, based on the forward stepwise method applying the Likelihood Ratio (LR) criterion, which adds variables based on the significance identified in the statistical scores (5%) and removes them from the tests according to the

maximum likelihood statistic (10%) obtained by the data set. The b-weight value (regression coefficient) associated with each independent variable was used to determine the probability of the elderly having OBS. In multivariate logistic regression, there was no collinearity between the independent (explanatory) variables through the tolerance analysis (>0.1) and the Variance Inflation Factor (<10). A significance level of 5% was considered.

The present study was approved by the Research Ethics Committee of the Faculdade de Ciências da Saúde (the Health Sciences School) of the Universidade de Brasília (the University of Brasília), under approval n° 410.161, dated 30 September 2013, and was carried out from September 2013 to December 2016.

RESULTS

A total of 372 volunteers were recruited and a total of 292 elderly women were deemed to be eligible, with a total of 172 allocated to the case group and 120 to the control group.

Among the socio-demographic and clinical factors investigated, there was a higher frequency of hypertension and of abdominal and urogynecological surgeries in the case group. The other characteristics were homogeneous.

When the analyzed variables of the groups were compared, there were significant differences in the presence of SAH and having undergone prior abdominal and pelvic surgery, with the case group having higher frequencies of these events. The case group also obtained higher scores in the GDS-15 and BAS questionnaires, with a significant difference between the groups.

Univariate logistic regression analysis showed that BMI, the diagnosis of hypertension, a previous history of abdominal and urogynecological surgery, number of abortions, and higher scores in the GDS-15 and BAS questionnaires were associated with OBS when analyzed in an isolated manner, as shown in Table 2. All the other analyzed variables had no association with OBS.

The ten variables that resulted in a p -value lower than 0.20 in univariate analysis were used in multivariate logistic regression analysis. Thus, in the final model, only the diagnosis of diabetes, a history

of urogynecological surgery and the maintaining of an active sex life remained as independent variables associated with OBS (Table 3).

Table 1. Comparison of demographic and clinical characteristics of the case group and the control group of elderly women living in the community (n= 292). Distrito Federal, 2016.

Variables	Case group (n=172)		Control group (n=120)		Mean difference [95% CI]	p -value
	Mean (sd)	n (%)	Mean (sd)	n (%)		
Age**	68.67 (6.12)		69.71 (6.75)		-1.04 (-2.53 a 0.45)	0.184
BMI**	28.07 (5.03)		26.76 (4.21)		1.31 (0.21 a 2.42)	0.05
Years of schooling**	1.31 (1.00)		1.36 (0.90)		-0.04 (-0.27 a 0.18)	0.476
Skin color/ethnicity***						
White		56 (32.6)		47(39.2)		0.447
Black/Afro-Brazilian		18 (10.5)		10 (8.3)		
Mixed-race		23 (13.4)		21(17.5)		
Asian-Brazilian		22 (12.8)		10 (8.3)		
Other		53 (30.8)		32 (26.7)		
Marital Status***						
Single		20 (11.6)		17 (14.2)		0.913
Married or cohabiting		66 (38.4)		45 (37.5)		
Divorced		32(18.6)		20 (16.7)		
Widowed		54 (31.4)		38 (31.7)		
Gestation**	5.42 (3.69)		5.45 (3.34)		-0.026(-0.86 a 0.81)	0.750
Vaginal deliveries**	4.15 (3.16)		4.43 (3.24)		-0.27(-1.02 a 0.47)	0.432
Cesarean deliveries**	0.42 (0.70)		0.48 (0.73)		-0.06(-0.23 a 0.11)	0.510
Abortions**	0.85 (1.42)		0.55 (0.92)		0.30 (0.03 a 0.57)	0.081
Physical activity (yes)***		101 (58.7)		62 (51.7)		0.141
Sexually active(yes)***		6 (12)		28 (23.3)		0.067
Smoker (yes)***		7 (4.1)		5 (4.2)		0.595
Constipation (yes)***		36 (20.9)		24 (20.2)		0.874
Diabetes (yes)***		30 (17.4)		29 (24.2)		0.183
SAH (yes)***		125 (72.7)		62 (51.7)		0.000
Abdominal surgery (yes)***		127 (73.8)		73 (60.8)		0.013
Urogynecological Surgery(yes)***		77 (44.8)		30 (25)		0.000
GDS-15**	5.47(2.89)		4.28 (2.81)		1.18(0.51 a 1.85)	0.000
BAS**	17.26(10.54)		10.51(9.64)		6.75 (4.36 a 9.13)	0.000
OAB-V8**	22.31 (6.49)		2.61 (2.34)		19.71(18.64 a 20.77)	0.000

Table 2. Univariate logistic regression to verify factors associated with overactive bladder syndrome. Distrito Federal, 2016.

Variables	Univariate analysis			
	b-weights	RR	95% CI	p-value
Age	-0.025	0.975	0.940 – 1.011	0.172
Body Mass Index	0.060	1.062	1.007 – 1.121	0.027
Years of schooling	-0.048	0.953	0.747 – 1.215	0.696
Skin color/ethnicity				
White	-0.329	0.719	0.401 - 1.292	0.270
Black/Afro-Brazilian	0.083	1.087	0.447 - 2.643	0.854
Mixed-race	-0.414	0.661	0.317 – 1.381	0.271
Asian-Brazilian	0.284	1.328	0.558 – 3.160	0.521
Other	-	-	-	-
Marital Status (lives without spouse)	-0.037	0.964	0.596 – 1.558	0.880
Gestation	-0.002	0.998	0.934 – 1.066	0.952
Vaginal deliveries	-0.027	0.974	0.905 – 1.047	0.471
Cesarean deliveries	-0.115	0.891	0.644 – 1.233	0.488
Abortions	0.217	1.242	1.001 – 1.540	0.048
Physical activity (yes)	0.286	1.331	0.832 – 2.128	0.233
Sexually active(yes)	-0.803	0.448	0.173 – 1.161	0.098
Smoker (yes)	-0.025	0.976	0.302 – 3.150	0.967
Constipation (yes)	-0.047	0.954	0.535 – 1.703	0.874
Diabetes (yes)	-0.411	0.663	0.373 – 1.177	0.161
Systemic Arterial Hypertension (yes)	0.911	2.488	1.523 – 4.063	0.000
Abdominal surgery (yes)	0.597	1.817	1.102 – 2.996	0.019
Urogynecological Surgery(yes)	0.889	2.432	1.459 – 4.053	0.001
Geriatric depression scale	0.149	1.160	1.064 – 1.266	0.001
Beck anxiety scale	0.068	1.070	1.042 – 1.098	0.000

RR= risk ratios; CI = Confidence interval.

Tabela 3. Univariate logistic regression to verify factors associated with overactive bladder syndrome. Distrito Federal, 2016.

Variables	Multivariate analysis			
	b-weights	RR	95% CI	p-value
Age	-0.038	0.963	0.900 – 1.030	0.267
Body Mass Index	0.057	1.059	0.972 – 1.152	0.189
Abortions	0.200	1.221	0.861 – 1.731	0.262
Sexually active(yes)	-1.233	0.292	0.089 – 0.954	0.041
Diabetes (yes)	-1.057	0.348	0.122 – 0.993	0.048
Systemic Arterial Hypertension (yes)	0.737	2.090	0.824 – 5.300	0.120
Abdominal surgery (yes)	0.623	1.864	0.751 – 4.628	0.179
Urogynecological Surgery(yes)	1.131	3.098	1.372 – 6.999	0.007
Geriatric depression scale	0.089	1.094	0.932 – 1.282	0.271
Beck anxiety scale	0.045	1.046	1.000 – 1.094	0.050

RR= risk ratios; CI= Confidence Interval.

These results indicate that maintaining an active sex life and the diagnosis of diabetes reduce the odds of having OBS by 70.8% and 65.2%, respectively, while a history of urogynecologic surgery increases the risk of OBS 3.098 times.

DISCUSSION

The present study identified a high prevalence of OBS among elderly women in the community studied (58.9%), a finding similar to other studies¹⁷⁻¹⁹. The risk factors assessed were: age; BMI; parity (gestations, vaginal deliveries, cesarean deliveries and abortions), schooling, previous abdominal and urogynecologic surgeries, physical activity, smoking, hypertension, depression, anxiety, diabetes mellitus and constipation.

The present study found that individuals in the case group had a higher BMI than those in control group, although this difference was not significant ($p=0.05$). Many studies have reported that high BMI is a factor associated with OBS^{12,18}. Brown et al.²⁰ affirmed that obesity is directly associated with UI and urinary symptoms such as micturition urgency, polyuria and nocturia, a fact that has also been observed by other authors^{21,22}. In the present study, however, no significant difference in BMI was found when the group of elderly women with OBS and those without OBS were compared, although univariate logistic regression analysis identified an association between BMI and OBS when considered separately. The relationship between OBS and BMI is not well defined in literature, as authors such as Oliveira et al.⁹ and Cheung et al.²³ did not observe such an association, and so further studies on the subject are required.

The diagnosis of SAH was more frequent among elderly women in the case group of the present study, and univariate logistic regression analysis indicated that this diagnosis was a factor associated with OBS. The same was observed in a study of 1,410 men and 1,546 women aged over 65 in Japan by Hirayama et al.¹¹, in which the diagnosis of SAH was equally and significantly greater in individuals with symptoms of OBS. Ekundayo²⁴ performed a review considering the presence of OBS in hypertensive patients and observed that there was an association between the use of diuretics and increased urinary frequency

and urgency, but not with UI. These authors stated that alterations in micturition may be related to treatments for hypertension, as antihypertensive medications and diuretics increase urine output, which exacerbates symptoms in patients with voiding dysfunction. Reis et al.²⁵ cite in their study that some medications, including diuretics and other medicines used in the treatment of hypertension, are possible causes of UI in the elderly. However, Jardim et al.²⁶ performed an integrative review of SAH and UI among the elderly and found no evidence of the relationship between the two conditions.

The case group in the present study scored higher in the GDS questionnaire, which suggests that this group may have more depressive symptoms than the control group. This result was also observed by other authors, such as Ikeda et al.¹⁸, in a study of 414 elderly men and 419 elderly women in Japan, the objective of which was to measure the prevalence of risk factors for OBS in elderly persons with questionnaires. The authors described a mean OBS prevalence of 17.6% in men and 19.1% in women, and stated that the risk for developing OBS was significantly higher in individuals with depressive symptoms and alcoholic habits and who were overweight. Alves et al.⁶, conducted a study in Brazil with 161 elderly women that evaluated the association between OBS and depression. The authors observed a high prevalence of OBS (76.3%), with 42.6% of sufferers presenting mild or severe depression, revealing a significant correlation between OBS and depression.

Hirayama et al.¹¹ conducted a similar study in Japan with 1,410 men and 1,546 women. Its objective was to evaluate the incidence and remission rate of OBS and its risk factors for new cases among the elderly. The authors observed that the incidence and remission rates in one year were 11.9% and 29.8%, respectively. They also observed a relationship between urinary symptoms and alcohol consumption and smoking, hypertension, and a depressive state in individuals with recent-onset OBS, all of which were significantly higher than in individuals without OBS.

When the BAS results of the groups were compared, the mean overall score of the case group was higher, suggesting a higher level of anxiety. This result is consistent with those described in the literature. Studies have shown that anxiety symptoms are common among the elderly and in

the majority of patients with symptoms of OBS^{27,28}. Knight et al.²⁸ carried out a study comparing the electromyography of the pelvic floor muscles of women with OBS symptoms and the BAS score of women without urinary complaints. Although the authors reported no difference in electromyography between the groups, the group with symptoms of OBS had significantly higher anxiety scores.

Lai et al.²⁷ studied the relationship between anxiety and OBS. These authors observed that 48% of individuals with symptoms of OBS also had symptoms of anxiety, with 24% of these suffering from moderate to severe anxiety. The authors state that the anxiety scores of individuals with OBS were significantly higher than the control results. Alves et al.²¹ also investigated this relationship, and observed a correlation between anxiety and OBS ($r=0,345$).

The elderly women in the case group presented significant differences in terms of prior history of abdominal and urogynecologic surgery and abortions, and these variables were presented as factors associated with OBS when analyzed in isolation. This relationship is not yet fully clarified in literature, with few studies specifically addressing these issues. Additional studies with long-term follow up periods are therefore required to prove such results.

In terms of surgeries, the multivariate analysis of the present study found that those who underwent urogynecological surgeries had a 3.098 greater chance of OBS. Abraham and Vasavada²⁹ performed a review on urgency after sling surgery. The authors reported an estimated 40% post-operative urgency rate, which may be due to urinary tract infection (7.4-17.4%), bladder outlet obstruction (1.9-19.7%), urinary tract perforation (0.5-5%) and/or idiopathic urgency (0-28%). Duru et al.³⁰ performed a systematic review in order to analyze urodynamic outcomes before and after a total hysterectomy for benign conditions and to report whether urinary function was altered after the hysterectomy. The authors observed that the urodynamic diagnosis of detrusor overactivity and UI symptoms were significantly reduced after a hysterectomy. The authors therefore concluded that a hysterectomy does not adversely affect urodynamic outcomes, nor does it increase the risk of adverse urinary symptoms, and may even improve some urinary functions.

While it was observed in the present study that maintaining an active sex life reduces the chance of developing OBS, no articles were found in literature to prove this finding, making it an excellent topic for future research. It is possible to find works such as that of Coyne et al.³¹, a cross-sectional study that evaluated the symptoms of OBS and the sexual activity of men and women through internet questionnaires in the United Kingdom, Sweden and the USA. The authors observed worse sexual health in individuals with OBS in comparison with those who did not suffer from the condition and warned about the importance of assessing the sexual health of men and women with OBS.

Chen et al.³² carried out a literature review that observed the relationship between urinary symptoms and female sexual dysfunction. The authors noted that sexual and urinary problems are often comorbid and have been associated with a wide range of sexual response deficiencies, including declines in desire, arousal, lubrication, orgasm, general sexual satisfaction and increased sexual pain, when compared with women without urinary symptoms. The authors stated that paying attention to urinary problems can improve women's sexual quality of life.

In this study, having diabetes was shown as a protective factor for OBS, a fact that contradicts results found in literature, such as those of the studies of Wen et al.¹² and Ikeda et al.¹⁰. Wen et al.¹² evaluated the prevalence of risk factors associated with OBS in China with 3,129 men and 6,676 women aged over 40 years. They observed that prevalence increased with age in both sexes, and was also higher in individuals with diabetes and with a BMI above 29. Likewise, a study carried out in Japan by Ikeda et al.¹⁰, involved the application of questionnaires on the presence of OBS symptoms in 652 diabetic patients and identified a prevalence of cases of 24.2% in the study population. The authors stated that this prevalence was twice as high as that of the general Japanese population. These results indicate the need to carry out further studies with larger and more representative samples.

A potential limitation of this work is difficulty in finding studies that refer to factors associated with OBS that mainly involve elderly women. This is an incentive for further research as there are still many

issues to be addressed. Another limiting factor was the large number of exclusions due to missing data in the questionnaires, which limited the sample.

One probable bias that should be considered in the present study is the use of questionnaires through interview. While questionnaires are important tools in data collection, both for diagnosis and for epidemiological studies, there is no consensus on how best to use them. It is not possible to predict how the patient understands/perceives the questions or how they will respond. Thus, the routine used during the completion of this instrument directly affects the quality of the data collected. Bowling³³, after conducting a systematic review, stated that different ways of applying questionnaires affect the quality of the data collected. This author affirms that there is no gold standard for the use of this instrument and that all forms have advantages and biases. However, despite the possibility of bias in

the method employed, it is unlikely that the use of another technique could have significantly altered the quality or results presented here.

CONCLUSION

The present study identified urogynecologic surgery as a factor associated with overactive bladder syndrome. In contrast, a diagnosis of diabetes and maintaining an active sex life were protective factors in elderly women in the community studied. However, additional studies are needed to prove these results.

Overactive bladder syndrome should be considered a public health problem as it is highly prevalent among elderly women. It is therefore necessary to elaborate new care strategies and actions of prevention and health promotion that contribute to healthier aging and quality of life.

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