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THE RELATIONSHIP BETWEEN SMOKING AND URINARY SYMPTOMS IN WOMEN

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ABSTRACT

Objective: To investigate the association between smoking and urinary symptoms in women, with a focus on its impact on urinary incontinence (UI) and quality of life.

Methods: A cross-sectional observational study involving 54 women aged 20 to 60, recruited via social media over a three-month period. The study included 37 female smokers with urinary symptoms. Sociodemographic, gynecological, obstetric, and smoking-related data were collected through an electronic form. UI was assessed using the ICIQ-SF questionnaire, with participants scoring ≥1 considered incontinent. Data analysis was performed using Jamovi software, applying Spearman's correlation ($p<0.05$).

Results: The average age was 35 years, and the mean BMI was 26.5 kg/m², indicating overweight. The average smoking load was 5.40 pack-years, with a daily consumption of 10 cigarettes over 10 years. Smoking was frequently associated with stress and anxiety. Regarding UI, 16.2% reported frequent leakage, while 32.4% reported occasional leakage. The mean ICIQ-SF score was 3, indicating mild symptoms.

Discussion: A mild yet significant association was found between smoking and urinary symptoms in women. Although the correlation was weak, the findings reinforce smoking as a risk factor for UI, linked to hormonal changes and pelvic floor overload. The association with stress and anxiety highlights the need for a multidisciplinary approach in smoking cessation programs.

Conclusion: Smoking was shown to be associated with mild urinary symptoms in women, reinforcing its harmful effects on urogynecological health.

Keywords: Nicotine. Quality of Life. Tobacco Use Disorder. Urinary Incontinence. Women.

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A RELAÇÃO ENTRE O TABAGISMO E SINTOMAS URINÁRIOS EM MULHERES

RESUMO

Objetivo: Investigar a associação entre o tabagismo e os sintomas urinários em mulheres, com foco em seu impacto na incontinência urinária (IU) e na qualidade de vida.

Métodos: Estudo observacional transversal com 54 mulheres, de 20 a 60 anos, recrutadas por redes sociais ao longo de três meses. Foram incluídas 37 mulheres tabagistas com sintomas urinários. Os dados sociodemográficos, ginecológicos, obstétricos e tabagistas foram coletados via formulário eletrônico. A IU foi avaliada por meio do questionário ICIQ-SF, considerando-se incontinentes as participantes com escore ≥1. A análise foi realizada com o software Jamovi, utilizando a correlação de Spearman ($p<0,05$).

Resultados: A média de idade foi de 35 anos e o IMC médio de 26,5 kg/m², indicando sobrepeso. A carga tabagista média foi de 5,40 anos/maço, com consumo diário de 10 cigarros por 10 anos. O tabagismo foi frequentemente associado a estresse e ansiedade. Quanto à IU, 16,2% relataram perdas frequentes e 32,4% perdas ocasionais. O escore médio no ICIQ-SF foi 3, indicando sintomas leves.

Discussão: A associação leve, porém significativa, entre o tabagismo e os sintomas urinários em mulheres. Embora a correlação tenha sido fraca, os achados reforçam o tabagismo como fator de risco para IU, associado a alterações hormonais e sobrecarga do assoalho pélvico. A associação com estresse e ansiedade sugere a necessidade de abordagem multidisciplinar nos programas de cessação do tabagismo.

Conclusão: O tabagismo demonstrou estar associado a sintomas urinários leves em mulheres, reforçando seus efeitos prejudiciais à saúde uroginecológica.

Palavras-chave: Nicotina. Qualidade de Vida. Transtornos Relacionados ao Uso de Tabaco. Incontinência Urinária. Mulheres.

LA RELACIÓN ENTRE EL TABAQUISMO Y LOS SÍNTOMAS URINARIOS EN MUJERES

RESUMEN

Objetivo: Investigar la asociación entre el tabaquismo y los síntomas urinarios en mujeres, con énfasis en su impacto sobre la incontinencia urinaria (IU) y la calidad de vida.

Métodos: Estudio observacional transversal con 54 mujeres, de entre 20 y 60 años, reclutadas a través de redes sociales durante un período de tres meses. Se incluyeron 37 mujeres fumadoras con síntomas urinarios. Los datos sociodemográficos, ginecológicos, obstétricos y relacionados al tabaquismo fueron recolectados mediante un formulario electrónico. La IU fue evaluada

utilizando el cuestionario ICIQ-SF, considerando incontinentes a las participantes con una puntuación ≥1. El análisis se realizó con el software Jamovi, utilizando la correlación de Spearman ($p<0,05$).

Resultados: La edad promedio fue de 35 años y el IMC promedio de 26,5 kg/m², indicando sobrepeso. La carga tabáquica promedio fue de 5,40 paquetes/año, con un consumo diario de 10 cigarrillos durante 10 años. El tabaquismo se asoció frecuentemente con el estrés y la ansiedad. En cuanto a la IU, el 16,2% reportó pérdidas frecuentes y el 32,4% pérdidas ocasionales. La puntuación media en el ICIQ-SF fue de 3, indicando síntomas leves.

Discusión: Se observó una asociación leve, pero significativa, entre el tabaquismo y los síntomas urinarios en mujeres. Aunque la correlación fue débil, los hallazgos refuerzan el tabaquismo como un factor de riesgo para la IU, asociado a alteraciones hormonales y sobrecarga del suelo pélvico. La asociación con el estrés y la ansiedad sugiere la necesidad de un enfoque multidisciplinario en los programas de cesación del tabaquismo.

Conclusión: El tabaquismo demostró estar asociado a síntomas urinarios leves en mujeres, lo que refuerza sus efectos perjudiciales sobre la salud uroginecológica.

Palabras clave: Nicotina. Calidad de Vida. Trastornos Relacionados con el Consumo de Tabaco. Incontinencia Urinaria. Mujeres.

INTRODUCTION

Urinary incontinence (UI) is defined by the International Continence Society (ICS) as the involuntary loss of urine and affects women across different age groups and levels of severity. This condition compromises both physical and mental health, causing insecurity, embarrassment, and even depression (Carvalho et al., 2014; Lopes & Higa, 2006).

Although UI is frequently associated with parity and advanced age, recent studies have shown an increase in cases among young and nulliparous women, suggesting that other risk factors must be explored (Lamerton et al., 2018). Factors such as anatomical alterations, chronic diseases, genetic predisposition, obesity, menopause, and smoking are widely recognized as possible contributors to lower urinary tract dysfunction (Higa, Lopes & Reis, 2008). A population-based analysis conducted in the United States revealed that approximately 61.8% of adult women reported UI symptoms, with 32.4% experiencing monthly or more frequent episodes (Patel et al., 2022). These data underscore the ongoing need to investigate risk factors associated with UI, including smoking, whose specific impact on the female urinary tract remains underestimated.

Among these factors, smoking stands out due to its increasing prevalence. According to the National Health Survey (PNS), 12.8% of Brazilians use tobacco products, including 11.2%

of women (Fiocruz, 2019). Despite the well-documented harmful effects of smoking, such as cardiovascular and respiratory diseases, the potential association between smoking and UI remains underexplored, even though it may have significant public health implications (Nunes, 2006; Higa, Lopes & Reis, 2006).

Physiological mechanisms suggest that smoking may increase the risk of UI through different pathways. Chronic and intense coughing caused by tobacco use raises intra-abdominal pressure, overloading the urethral sphincter system, which can result in stress urinary incontinence (SUI) (Higa, Lopes & Reis, 2008). Additionally, tobacco compounds such as nicotine and carbon monoxide may impair estrogen levels, triggering early menopause and weakening the pelvic floor (Bump & McClish, 1992). Smoking can also negatively affect the integrity of the pelvic floor connective tissue. Studies have shown that alterations in the synthesis and degradation of collagen particularly types I and III are associated with pelvic floor dysfunction. These changes may compromise the strength and elasticity of pelvic muscles, favoring the development of conditions such as UI (Gao et al., 2024).

The pelvic floor (PF), a structure responsible for supporting pelvic organs, regulating urination, and contributing to sexual function, is highly vulnerable to mechanical pressure and hormonal fluctuations. Damage in this region can lead to urinary dysfunctions, particularly when combined with factors such as obesity and smoking—whose effects may be irreversible in some cases (Geoffrion, 2010; Bump & McClish, 1992).

The mechanism linking smoking and pelvic floor dysfunctions remains unclear, and considering the scarcity of literature on the relationship between smoking and urinary symptoms in women, our hypothesis is that smoking significantly contributes to urinary symptoms due to its physiological and behavioral impacts. Therefore, the objective of this study is to investigate the association between smoking and urinary symptoms in adult women, exploring its prevalence and impact on quality of life.

METHODS

This is a cross-sectional observational study. It was approved by the local Research Ethics Committee (Opinion No. 6.470.914), and participant recruitment occurred between February and May 2024. All participants were informed about the research's objectives and procedures and voluntarily agreed to participate by signing a digital informed consent form (ICF), as recommended by Brazilian Resolution No. 466/12.

Inclusion criteria: female smokers aged 20–60 years with urinary symptoms, literate, native Portuguese speakers, and who signed the ICF. Exclusion criteria: men, non-smokers, women with chronic degenerative diseases, uncontrolled metabolic disorders, urinary tract infections, or neurological/psychiatric conditions.

Demographic data were collected via an online form, including age, marital status, ethnicity, and education. Clinical variables included medical history, medication use, menopausal status, and urinary infection history. Obstetric data included the number and type of deliveries. Smoking-related variables included years of smoking, pack-years, and number of cigarettes per day.

OUTCOME MEASURES

Participants answered the International Consultation on Incontinence Questionnaire – Short Form (ICIQ-SF), which assesses frequency, severity, and quality-of-life impact of UI. The total score ranges from 0 to 21; scores ≥1 were considered incontinent. Higher scores indicate greater severity and impact.

Statistical analysis was performed using Jamovi software (version 2.3.13). To assess the relationship between smoking history and urinary symptoms, Spearman's correlation was applied using the variables: "years smoking," "pack-years," and "cigarettes per day" vs. ICIQ-SF score. Correlation values were interpreted according to Mukaka's classification: 0.00–0.19 = very weak, 0.20–0.39 = weak, 0.40–0.59 = moderate, 0.60–0.79 = strong, 0.80–1.00 = very strong. A significance level of $p<0.05$ was adopted.

RESULTS

Thirty-seven women were considered eligible for the study, and their demographic and clinical characteristics are presented in Table 1. The study sample consisted of women with a mean age of 35 years, most of whom were single (56.8%), of mixed race (45.9%), and had completed higher education (40.5%). The average Body Mass Index (BMI) was 26.5 kg/m², suggesting that most participants were in the overweight range. A total of 75.7% had no chronic conditions, while 24.3% reported conditions such as diabetes, hypertension, or high cholesterol, and 78.4% were not taking any medications. Menopause was reported by 18.9% of the sample, and 25% reported urinary incontinence during pregnancy, with 65% of these women having had a vaginal delivery (Table 1).

Table 1 – Demographic and Clinical Characteristics

Variable	**Sample Analyzed (N=37)**
Age (years)	±35
Marital Status	
Married	14 (37.8%)
Divorced	2 (5.4%)
Single	21 (56.8%)
Race/Ethnicity	
White	14 (37.8%)
Black	6 (16.2%)
Mixed	17 (45.9%)
Education	
Complete Elementary	2 (5.4%)
Incomplete Elementary	2 (5.4%)
Complete High School	9 (24.3%)
Incomplete High School	1 (2.7%)
Complete Higher Education	15 (40.5%)
Incomplete Higher Education	8 (21.6%)
BMI (kg/m²)	±26.5
Medical History	
High Cholesterol	2 (5.4%)
Diabetes	1 (2.7%)
Diabetes, Cancer	1 (2.7%)
Diabetes, High Cholesterol	1 (2.7%)
Diabetes, Hypertension	1 (2.7%)
Diabetes, Hypertension, High Cholesterol, Dementia	1 (2.7%)
Hidradenitis Suppurativa	1 (2.7%)
Hypertension	1 (2.7%)
None	28 (75.7%)
Medications	
Antidepressants	2 (5.4%)
Antidepressants, Enalapril	1 (2.7%)
Diuretics	1 (2.7%)
Diuretics, Antidepressants, Kidney Stone	1 (2.7%)
Levothyroxine	1 (2.7%)
Muscle Relaxant	1 (2.7%)
Thyroid, Cholesterol, Calcium	1 (2.7%)
None	29 (78.4%)
Urogynecological History	Menopause – 7 (18.9%)
Obstetric History (N=20)	
UI during pregnancy	5 (25.0%)
Vaginal Delivery	13 (65.0%)
Cesarean Section	7 (35.0%)

Participants had smoked for an average of 10 years, with a mean pack-year value of 5.40. Average daily consumption was 10 cigarettes. Smoking was most often associated with stress and anxiety. The most common context reported was "after meals, anxiety, relaxation, and stress" (16.2%). Table 2.

Table 2 – Smoking History

Variable	**Sample Analyzed (N=37)**
How many cigarettes do you smoke per day?	±10
How long have you smoked? (years)	±10
Smoking Load (pack-years)	±5.40
In what situations do you smoke?	
Anxiety	3 (8.1%)
Anxiety, Stress	1 (2.7%)
Anxiety, Relax	2 (5.4%)
Anxiety, Relax, Stress	1 (2.7%)
Phone, Anxiety, Work, Relax, Stress	1 (2.7%)
Phone, After Meals, Anxiety, Work, Relax, Stress	3 (8.1%)
Phone, After Meals, Anxiety, Relax, Stress	2 (5.4%)
Phone, After Meals, Work, Relax	1 (2.7%)
After Meals	2 (5.4%)
After Meals, Anxiety	2 (5.4%)
After Meals, Anxiety, Stress	1 (2.7%)
After Meals, Anxiety, Work	1 (2.7%)
After Meals, Anxiety, Work, Stress	1 (2.7%)
After Meals, Anxiety, Work, Relax, Stress	4 (10.8%)
After Meals, Anxiety, Relax, Stress	6 (16.2%)
After Meals, Relax	1 (2.7%)
None	1 (2.7%)
Relax	4 (10.8%)

51.4% of women reported no urine leakage. However, 16.2% experienced it multiple times per day. Most leakage was of small volume (32.4%) and occurred before reaching the bathroom (16.2%) or during coughing/sneezing (8.1%). The mean ICIQ-SF score was 3, indicating mild symptom severity. Table 3.

Table 3 – Urinary Symptoms

Variable	**Sample Analyzed (N=37)**
How often do you lose urine?	
Several times a day	6 (16.2%)
Two to three times a week	6 (16.2%)
Never	19 (51.4%)
Once a day	1 (2.7%)
Once a week or less	5 (13.5%)
How much urine do you think you lose?	
None	18 (48.6%)
A moderate amount	7 (18.9%)
A small amount	12 (32.4%)
When do you lose urine?	
Never	19 (51.4%)
Before reaching the bathroom	6 (16.2%)
Before reaching the bathroom, when coughing or sneezing	2 (5.4%)
Before reaching the bathroom, when coughing or sneezing, during physical activity	1 (2.7%)
Before reaching the bathroom, when coughing or sneezing, after urinating while dressing	1 (2.7%)
After urinating while dressing	2 (5.4%)
When coughing or sneezing	3 (8.1%)
When coughing or sneezing, during physical activity	1 (2.7%)
Without apparent reason	2 (5.4%)
ICIQ-SF Score	±3

DISCUSSION

The present study investigated the relationship between smoking and urinary incontinence (UI) in adult women, as previous studies suggest that smoking may increase the risk of UI through mechanisms such as frequent and intense coughing, which compromises the urethral sphincter mechanism, and hormonal changes induced by tobacco components like nicotine and carbon monoxide, which may hasten menopause and affect the integrity of the pelvic floor (Higa, Lopes, Reis, 2008; Bump & McClish, 1992).

The results of this study revealed a weak correlation between smoking and urinary symptoms, likely influenced by the small sample size (n=37). Nevertheless, the findings are consistent with the existing literature, such as studies by Kawahara et al. and Hannestad et al., which identified smoking as an important risk factor for lower urinary tract symptoms, especially in current and former smokers (Kawahara et al., 2020; Hannestad et al., 2003).

The participants' average consumption of 10 cigarettes per day over 10 years indicates substantial tobacco exposure, reinforcing the need to further explore the cumulative effects of smoking on urinary function.

Factors such as overweight, menopause, and obstetric history play a significant role in worsening urinary incontinence. In our sample, 18.9% of participants were menopausal—a period marked by decreased estrogen levels, which impairs pelvic floor musculature (Guarisi et al., 2001). Menopause leads to a reduction in estrogen, a hormone essential for maintaining the trophism and vascularization of pelvic floor muscles. This decline contributes to structural changes, such as decreased elasticity and tissue thickness in the urethra and bladder, which can compromise urinary continence (Batista et al., 2010). Additionally, research highlights that pelvic floor weakening is intrinsically linked to UI (Magalhães & Livramento, 2023).

Women who reported UI during pregnancy (25% of the sample) also had a higher risk of persistent symptoms postpartum. During pregnancy, physiological changes such as increased intra-abdominal pressure and elevated progesterone levels impact the pelvic floor muscles, raising the risk of UI. This condition is more common in the third trimester and, although prevalence often decreases after childbirth, factors such as multiple pregnancies and delivery type especially vaginal delivery can contribute to the persistence of symptoms (Rocha et al., 2017).

Furthermore, the average BMI of 26.5 kg/m² in this study aligns with evidence linking overweight and obesity to a higher risk of UI. Epidemiological studies indicate that increasing BMI can elevate the risk of UI by up to 70%, primarily due to the increased mechanical pressure on the pelvic floor, which can lead to structural damage and functional impairment (Subak, Richter & Hunskaar, 2009; Bernardes, 2018; Rocha et al., 2017).

This association becomes even more critical when combined with smoking, as both smoking and obesity are positively correlated with increased intravesical pressure. These pressures, often exacerbated by smokers' chronic coughing, may exceed urethral resistance and result in involuntary urinary leakage particularly stress urinary incontinence (SUI). Studies indicate that current and former smokers have higher intravesical pressures compared to non-smokers, suggesting that smoking significantly increases the predisposition to SUI, even after smoking cessation (Fuganti, Gowdy & Santiago, 2011).

A study that examined the association between chronic obstructive pulmonary disease (COPD) often caused by smoking—and SUI demonstrated that persistent coughing increases intra-abdominal pressure, overloading the urethral sphincter mechanism. Beyond the direct impact of coughing, chronic hypoxia and systemic inflammation characteristic of COPD indirectly affect the urinary tract and pelvic floor, contributing to urinary dysfunction (Hrisanfow & Hägglund, 2012). These findings support our study, which identified urinary leakage during episodes of coughing or sneezing in 8.1% of participants.

Although urinary symptoms reported in this study were mild with an average ICIQ-SF score of 3 their subjective severity does not minimize their impact on women's quality of life. Previous studies show that even mild UI symptoms can lead to feelings of shame, low self-esteem, social isolation, and anxiety, hindering daily activities and the pursuit of treatment (Saboia et al., 2017; Alves et al., 2022). This suggests that, although UI is widely recognized as a distressing and embarrassing condition, its severity is often underestimated by the women themselves.

The stigma surrounding UI contributes to the normalization of urinary leakage episodes by many women, delaying their pursuit of medical care and appropriate treatment (Alves et al., 2022). Moreover, a lack of knowledge about available treatment options may reinforce the belief that nothing can be done to alleviate the symptoms. Barriers to seeking care are influenced by emotional, social, and cultural factors. Many women report feelings of shame and embarrassment, which prevent them from discussing the problem with healthcare professionals—especially male practitioners. The difficulty accessing specialized professionals and skepticism about treatment efficacy also discourage help-seeking (Volkmer et al., 2011).

In addition to physiological factors, this study showed that smoking is frequently associated with stress and anxiety. Although many smokers believe that cigarettes relieve these symptoms, studies by Valença et al. and Cardoso et al. suggest the opposite—indicating that smoking may be linked to mental disorders, including depression and greater perceived anxiety. Cardoso et al. (2021) emphasize that early initiation of smoking and continued use of tobacco products are strongly associated with behavioral and emotional disorders. This relationship highlights the need for multidisciplinary smoking cessation strategies that address both the physiological and psychological aspects of the habit (Valença et al., 2001).

Although the observed association between smoking and incontinence did not reach strong statistical significance and the study has limitations such as small sample size and self-report bias it is important to consider that this was a cross-sectional study with limited statistical power. Nevertheless, the findings raise relevant questions and reinforce the importance of further investigation. This study supports smoking as a significant risk factor for urinary symptoms, even when symptoms are mild. We recommend conducting longitudinal studies with larger samples to evaluate symptom progression in smokers and to investigate the specific mechanisms linking smoking to UI. Additionally, including a non-smoking control group and conducting more detailed analyses of smoking burden such as intensity and duration could provide valuable insights for clinical interventions. Clinical implications include the need for increased awareness of the link between smoking and UI, as well as integrated prevention and management strategies that place smoking cessation at the center of therapeutic approaches. Public health campaigns should focus on reducing the stigma around UI, encouraging women to seek medical help, and addressing modifiable risk factors such as tobacco use to improve women's health and quality of life.

CONCLUSION

This study demonstrated an association between smoking and mild urinary symptoms in women. Despite the small sample size, the findings highlight the potential urogynaecological impact of tobacco use. These results emphasize the need for smoking cessation interventions and early urinary symptom management to improve women's health and quality of life.

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