

Independent Association of Defecatory Straining and Physical Activity with Urinary Incontinence in Women Aged 25–35 Years: A Cross-Sectional Study

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Abstract

Purpose

To evaluate the independent association of defecatory straining and physical activity level with the presence of urinary incontinence (UI) in women aged 25–35 years.

Methods

Cross-sectional study of 257 women aged 25–35 years recruited in Spain. UI was assessed using the Urogenital Distress Inventory-6 (UDI-6); quality-of-life impact using the Incontinence Impact Questionnaire-7 (IIQ-7). Constipation was characterized by five self-reported items. Physical activity was classified as low, moderate, or high using the International Physical Activity Questionnaire (IPAQ). Bivariate and multivariable logistic regression analyses were performed, adjusting for BMI and instrumental delivery.

Results

UI prevalence was 65.4%. Defecatory straining was reported by 40.5% of women, of whom 76.9% had UI versus 57.5% of non-strainers ($p = 0.001$). In bivariate analysis, straining (OR = 2.45; 95% CI 1.40–4.30) and low physical activity (OR = 1.96 vs high; 95% CI 1.05–3.67) were associated with UI. After multivariable adjustment, straining remained independently significant (adjusted OR = 1.57; 95% CI 1.19–2.08; $p = 0.002$), while physical activity showed a non-significant protective trend (adjusted OR = 1.38; 95% CI 0.97–1.96; $p = 0.072$). Stress-type symptoms predominated over urgency-type symptoms.

Conclusion

Defecatory straining is independently associated with UI in young women. Physical activity shows a non-significant protective trend. Systematic assessment of bowel habits and promotion of moderate physical activity should be integrated into UI prevention strategies in this population.

Introduction

Urinary incontinence (UI) is the involuntary loss of urine that constitutes a social or hygienic problem [1]. It negatively impacts physical, psychological, and social quality of life [2–4]. In women, UI is common yet often underdiagnosed [5, 6].

The pathophysiology of female UI is multifactorial. Risk factors include age, obesity, pregnancy and childbirth, and lifestyle habits such as smoking and constipation [7–10]. Constipation may contribute to UI through sustained increases in intra-abdominal pressure and mechanical stress on the pelvic floor

[11–13]. The relationship between physical activity and UI is complex: high-impact sports increase stress UI prevalence even in nulliparous women [14–16], while moderate physical activity and walking have been associated with lower UI risk in older women [17–21].

Most studies have focused on older women or elite athletes [17, 18, 20, 21]. Data on young women of reproductive age are limited. This study analyzes the independent association of constipation-related variables and physical activity with UI in women aged 25–35 years. We hypothesized that defecatory straining and low physical activity would be independently associated with UI after adjustment for potential confounders.

Materials and methods

Study design and population

A cross-sectional observational study was conducted in Spain, the study was reported in accordance with the STROBE statement. The sample size ($n = 257$) was calculated for prevalence estimation (expected prevalence 20%, 95% confidence level, precision $k = 2$) based on the Spanish female population aged 25–35 years (INE, 2015). This calculation was not powered for subgroup comparisons.

Inclusion criteria: women aged 25–35 years providing written informed consent. Exclusion criteria: ongoing pelvic floor treatment or structured interventions targeting studied risk factors. Recruitment was voluntary through healthcare institutions (physiotherapy centers, university).

Ethics

This observational study using anonymized questionnaire data was conducted in accordance with Spanish data protection law (LOPDGDD 3/2018) and the Declaration of Helsinki. All participants provided written informed consent. According to applicable regulations and the characteristics of the study, ethics committee approval was not required, given its observational design and the use of anonymized data.

Variables and instruments

UI was assessed using the UDI-6 validated in Spanish [2, 23]; any score > 0 indicated UI presence. UI subtypes were classified using specific UDI-6 items: item 2 (urgency UI), item 3 (stress UI). Quality-of-life impact was assessed using the IIQ-7 [2, 22, 23]. Constipation was characterized by five items: straining to defecate, weekly defecation frequency, incomplete evacuation, need for manual maneuvers, and laxative use. Physical activity was assessed using the IPAQ short form [3, 24], classifying participants as low, moderate, or high activity. Additional variables included BMI (SEEDO criteria [25]), smoking status, obstetric history, perceived stress (PSS-10 [26]), and daily fluid intake (BEVQ-15 [27, 28]).

Statistical analysis

Analysis was performed using SAS v9.4. Categorical variables were compared using chi-square or Fisher's exact tests; quantitative variables using Wilcoxon test. Significance was set at $p < 0.05$.

Crude odds ratios (OR) with 95% confidence intervals (CI) were calculated using bivariate logistic regression (Table 2). A multivariable logistic regression model was fitted including BMI (continuous), instrumental delivery, defecatory straining, and physical activity level (IPAQ), using stepwise backwards selection with minimum Akaike Information Criterion (AIC) (Table 3).

Results

Table 1 shows participant characteristics. Of 257 women (mean age 32.4 years), 168 (65.4%) had UI and 89 (34.6%) were continent. Women with UI were slightly older ($p = 0.022$). No significant differences were found for education ($p = 0.175$), BMI ($p = 0.449$), pregnancy ($p = 0.099$), or fluid intake ($p = 0.377$). Among incontinent women, stress-type symptoms (33.9%) predominated over urgency-type (25.6%).

Defecatory straining was the only constipation-related variable significantly associated with UI: 76.9% of strainers had UI versus 57.5% of non-strainers ($p = 0.001$). Defecation frequency ($p = 0.431$), incomplete evacuation ($p = 0.165$), manual maneuvers ($p = 0.391$), and laxative use ($p = 0.231$) were not significant. Physical activity showed a non-significant trend ($p = 0.089$), with UI prevalence decreasing from 71.4% (low) to 56.0% (high). Perceived stress ($p = 0.465$) and fluid intake ($p = 0.377$) were not associated with UI.

Table 1

Sociodemographic, clinical, and lifestyle characteristics of participants stratified by continence status (n = 257)

	Total (n = 257)	Continent (n = 89)	Incontinent (n = 168)	p
Sociodemographic				
Age, means		30.5	31.3	0.022
Education level, n (%)				0.175
Primary	4 (1.6)	3 (75.0)	1 (25.0)	
Secondary	26 (10.1)	8 (30.8)	18 (69.2)	
Vocational training	64 (24.9)	23 (35.9)	41 (64.1)	
University	159 (61.9)	55 (34.6)	104 (65.4)	
Other	4 (1.6)	0 (0.0)	4 (100.0)	
Anthropometric				
Weight (kg), mean $\pm$ SD	61.8 $\pm$ 12.3	61.0 $\pm$ 11.3	62.2 $\pm$ 12.8	0.508
Height (m), mean $\pm$ SD	1.64 $\pm$ 0.08	1.64 $\pm$ 0.08	1.64 $\pm$ 0.07	0.910
BMI (kg/m ²), mean $\pm$ SD	23.0 $\pm$ 4.2	22.7 $\pm$ 4.2	23.1 $\pm$ 4.2	0.449
BMI category (SEEDO), n (%)				0.410
Underweight (< 18.5)	20 (7.8)	9 (45.0)	11 (55.0)	
Normal (18.5–24.9)	167 (65.0)	58 (34.7)	109 (65.3)	
Overweight (25.0–29.9)	50 (19.5)	18 (36.0)	32 (64.0)	
Obesity ($\geq$ 30.0)	20 (7.8)	4 (20.0)	16 (80.0)	
Obstetric history				
Pregnancy (yes), n (%)	66 (25.7)	17 (25.8)	49 (74.2)	0.099
Delivery (yes), n (%)	60 (23.3)	15 (25.0)	45 (75.0)	
Vaginal delivery	37 (61.7)	9 (24.3)	28 (75.7)	
Cesarean section	19 (31.7)	4 (21.1)	15 (78.9)	0.755
Instrumental/lesions	37 (61.7)	9 (24.3)	28 (75.7)	1.000
Episiotomy	30 (81.1)	9 (30.0)	21 (70.0)	
Perineal tears	11 (29.7)	3 (27.3)	8 (72.7)	
Lifestyle and habits				

	Total (n = 257)	Continent (n = 89)	Incontinent (n = 168)	<i>p</i>
Sociodemographic				
Smoking (yes), n (%)	60 (23.4)	15 (25.0)	45 (75.0)	0.088
Physical activity (IPAQ), n (%)				0.089
Low	119 (46.3)	34 (28.6)	85 (71.4)	
Moderate	63 (24.5)	22 (34.9)	41 (65.1)	
High	75 (29.2)	33 (44.0)	42 (56.0)	
PSS-10, mean $\pm$ SD		19.9 $\pm$ 2.8	20.2 $\pm$ 2.8	0.465
Fluid intake (cl/day), mean $\pm$ SD	181.0 $\pm$ 90.7	175.4 $\pm$ 94.3	183.9 $\pm$ 88.9	0.377
Constipation-related variables				
Straining to defecate (yes), n (%)	104 (40.5)	24 (23.1)	80 (76.9)	0.001*
Defecation freq. (per wk), mean $\pm$ SD	5.30 $\pm$ 3.21	5.52 $\pm$ 3.17	5.18 $\pm$ 3.24	0.431
Incomplete evacuation (yes), n (%)	213 (82.9)	78 (36.6)	135 (63.4)	0.165
Manual maneuvers (yes), n (%)	14 (5.4)	3 (21.4)	11 (78.6)	0.391
Laxative use (yes), n (%)	46 (17.9)	12 (26.1)	34 (73.9)	0.231
UI symptoms (UDI-6), among incontinent n (%)				
Frequent urination		—	113 (67.3)	
Urgency leakage		—	43 (25.6)	
Stress leakage		—	57 (33.9)	
Small-amount leakage		—	49 (29.2)	
Difficulty emptying		—	29 (17.3)	
Hypogastric pain/discomfort		—	53 (31.5)	
Quality of life				
UDI-6 total, mean $\pm$ SD	7.49 $\pm$ 8.09	—	—	
IIQ-7 total, mean $\pm$ SD	6.28 $\pm$ 16.20	—	—	

Data are presented as mean $\pm$ SD or median [Q1–Q3] for continuous variables and n (%) for categorical variables.

p-values from Wilcoxon rank-sum test (continuous) or chi-square / Fisher's exact test (categorical). * $p < 0.05$.

BMI = body mass index; SEEDO = Sociedad Española para el Estudio de la Obesidad; IPAQ = International Physical Activity Questionnaire;

PSS-10 = Perceived Stress Scale; UDI-6 = Urogenital Distress Inventory; IIQ-7 = Incontinence Impact Questionnaire.

In bivariate logistic regression (Table 2), straining was significantly associated with UI (OR = 2.45; 95% CI 1.40–4.30; $p = 0.001$). Low physical activity was associated with higher UI odds versus high activity (OR = 1.96; 95% CI 1.05–3.67; $p = 0.030$). Pregnancy (OR = 1.75; $p = 0.090$) and smoking (OR = 1.80; $p = 0.080$) showed non-significant trends. Age was significant (OR = 1.05 per year; $p = 0.040$).

Table 2
Bivariate logistic regression: crude odds ratios for factors associated with urinary incontinence

Variable	OR (95% CI)	<i>p</i>
Straining to defecate (yes vs no)	2.45 (1.40–4.30)	0.001*
Physical activity (IPAQ)		
High (reference)	1.00	—
Moderate vs High	1.27 (0.65–2.47)	0.320
Low vs High	1.96 (1.05–3.67)	0.030*
Pregnancy (yes vs no)	1.75 (0.95–3.20)	0.090
Smoking (yes vs no)	1.80 (0.92–3.50)	0.080
BMI (continuous, per kg/m ²)	1.02 (0.96–1.09)	0.490
Age (per year increase)	1.05 (1.00–1.10)	0.040*

OR = odds ratio; CI = confidence interval. * $p < 0.05$.

Reference categories: no straining, high physical activity, no pregnancy, non-smoker.

Age modeled as continuous variable (per year increase based on birth date).

In multivariable analysis (Table 3), straining remained independently significant (adjusted OR = 1.57; 95% CI 1.19–2.08; $p = 0.002$). Low physical activity showed a non-significant trend (adjusted OR = 1.38; 95% CI 0.97–1.96; $p = 0.072$). BMI ($p = 0.938$) and instrumental delivery ($p = 0.296$) were not significant. Model $R^2 = 0.061$; AIC = 326.7.

Table 3

Multivariable logistic regression: crude and adjusted odds ratios for factors associated with urinary incontinence

Variable	Crude OR (95% CI)	<i>p</i>	Adjusted OR (95% CI)	<i>p</i>
Straining (yes vs no)	2.45 (1.40–4.30)	0.001	1.57 (1.19–2.08)	0.002
IPAQ: Low vs High	1.96 (1.05–3.67)	0.030	1.38 (0.97–1.96)	0.072
IPAQ: Moderate vs High	1.27 (0.65–2.47)	0.320	1.04 (0.70–1.56)	0.843
BMI (continuous)	1.02 (0.96–1.09)	0.490	1.00 (0.97–1.04)	0.938
Instrumental delivery (yes vs no)	1.10 (0.41–2.94)	0.850	1.25 (0.82–1.90)	0.296
<i>Model: R² = 0.061; AIC = 326.7</i>				

OR = odds ratio; CI = confidence interval.

Adjusted model includes: straining to defecate, physical activity (IPAQ), BMI (continuous), and instrumental delivery.

Model selected via stepwise backwards selection with minimum AIC criterion (SAS v9.4).

R² = 0.061; AIC = 326.7. Reference category for IPAQ: High activity.

Discussion

In this cohort of women aged 25–35 years, UI prevalence was 65.4%, consistent with recent evidence of substantial stress UI burden in young women [20, 21]. The main finding is that defecatory straining was independently associated with UI after multivariable adjustment, while physical activity showed a non-significant protective trend.

The independent association between straining and UI (adjusted OR = 1.57; *p* = 0.002) supports a direct pathophysiological link between chronic straining and pelvic floor dysfunction. Amselem et al. demonstrated that constipation affects a significant proportion of women with pelvic floor dysfunctions through stretching of pelvic nerves [11]. Bradley et al. described constipation as frequent in women with stress UI [12], and Bump and Norton noted that repeated intra-abdominal pressure increases contribute to deterioration of urethral support [13]. Other constipation dimensions showed consistent patterns but did not reach significance, likely due to limited subgroup sizes.

Regarding physical activity, the crude association (OR = 1.96 for low vs high; *p* = 0.030) was attenuated after adjustment (adjusted OR = 1.38; *p* = 0.072), suggesting partial confounding. Nevertheless, the direction of effect remained consistent and agrees with Danforth et al. [17] and Townsend et al. [18], who found lower UI incidence in physically active women. Our findings extend this observation to women

aged 25–35 years. The IPAQ does not distinguish between low- and high-impact activities, limiting extrapolation to elite athletes [14–16].

The predominance of stress-type symptoms (33.9%) over urgency-type (25.6%) is consistent with Minassian et al. [29], who reported that stress-type UI predominates among younger women, whereas urgency and mixed subtypes become more prevalent with advancing age.

Clinically, these findings support systematic assessment of bowel habits particularly defecatory straining in young women with UI. Promoting moderate physical activity may provide additional preventive benefit, although further studies with larger samples are needed to confirm this association.

This study has several limitations. The cross-sectional design precludes causal inference. All measures were self-reported, potentially introducing recall bias, although validated instruments were used. The sample size was calculated for prevalence estimation, not subgroup comparisons, limiting power for detecting modest effects. Recruitment through social networks may overrepresent symptomatic women. The multivariable model's low R^2 (0.061) suggests unmeasured factors contribute to UI. Strengths include the focus on an understudied age group and use of multiple validated instruments [2, 3, 22–28].

Conclusion

In women aged 25–35 years, defecatory straining is independently associated with UI (adjusted OR = 1.57; $p = 0.002$). Physical activity shows a non-significant protective trend (adjusted OR = 1.38; $p = 0.072$). Systematic assessment of bowel habits and promotion of moderate physical activity should be integrated into UI prevention and conservative management strategies in young women.

Declarations

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Competing interests: The authors have no relevant financial or non-financial interests to disclose.

Ethics approval: According to applicable regulations and the characteristics of the study, ethics committee approval was not required, given its observational design and the use of anonymized data. The study was performed in line with the principles of the Declaration of Helsinki.

Consent to participate: Informed consent was obtained from all individual participants included in the study.

Consent to publish: The authors affirm that all participants provided informed consent for the anonymized publication of their data. No identifying information about individual participants is included in this article.

Data availability: The datasets generated and analyzed during the present study are available upon reasonable request to the corresponding author.

Author Contribution

K Bouallalene-Jaramillo: Protocol/project development, Data collection, Data analysis, Manuscript writing/editing. A Rodríguez-Baeza: Protocol/project development, Manuscript writing/editing. J Calvo-Sanz: Data analysis, Manuscript writing/editing. All authors read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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