

ORIGINAL RESEARCH

Pelvic Inflammatory Disease is a Risk Factor for Overactive Bladder

Alexandra McQuillen, D.O.¹, Vaishnavi J Patel, D.O.² , Caroline Auxier, D.O.³, Aakaash Duggal, MS1⁴, Meghan Etsey, MS4⁵, Devki Patel, MS3⁶, Young Son, D.O.⁷, Brianna Clark, D.O.⁸

¹ Philadelphia College of Osteopathic Medicine, ² Dept of Population Health, Division of Family Medicine, The University of Texas at Austin Dell Medical School Family Medicine Residency, ³ Touro University of California College of Osteopathic Medicine, ⁴ Texas A&M University Naresh K. Vashisht College of Medicine, ⁵ St. George's University School of Medicine, ⁶ Texas Tech University Health Sciences Center School of Medicine, ⁷ Department of Urology, Thomas Jefferson University, ⁸ Sunflower Lactation & Health Education LLC

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Context

Pelvic inflammatory disease (PID) is an ascending infection of the reproductive tract that can cause infertility and ectopic pregnancy. While reproductive effects are well known, urinary impacts remain underexplored. Overactive bladder (OAB)—characterized by urgency, frequency, and nocturia—may be associated with PID. Clarifying this relationship is important in primary care, where both conditions affect quality of life and are often underdiagnosed. This is a publication of the abstract and poster of this preliminary work that was presented at the 2025 TAFP Primary Care Summit.

Objective

To evaluate the association between PID and OAB symptoms among U.S. women.

Design

Retrospective cohort study using secondary analysis of the National Health and Nutrition Examination Survey (NHANES) 2017–2020.

Setting

Nationally representative community-based survey.

Patients or Other Participants

Women ≥18 years who completed both the Reproductive Health and Kidney Conditions questionnaires in NHANES. Participants were classified by self-reported PID history and OAB symptoms.

Main and Secondary Outcome Measures

Primary outcome: prevalence of OAB (urgency, leakage, nocturia). Secondary outcomes: leakage characteristics, daily activity impact, and nocturnal urination frequency.

Results

The results and findings of this study are preliminary. Weighted analysis represented ~41 million U.S. women. Those with PID were more likely to report leakage during physical activity ($p=0.002$), leakage before reaching the

toilet ($p=0.004$), bothersome leakage ($p=0.014$), activity limitation due to leakage ($p=0.003$), and increased nocturnal urination ($p=0.002$). Logistic regression showed PID remained significantly associated with OAB after adjusting for age and race.

Conclusions

PID is significantly associated with OAB symptoms in U.S. women. While causality cannot be determined, findings support targeted urinary symptom screening in patients with prior PID. Further studies should investigate underlying mechanisms and potential preventive strategies in primary care settings. In addition, as mentioned, this is preliminary work that was presented at the 2025 TAFP Primary Care Summit.

Introduction

Pelvic inflammatory disease (PID) is an inflammatory condition caused by bacteria from the vagina infecting the reproductive organs, leading to severe complications such as infertility and ectopic pregnancies. Overactive bladder (OAB) is a syndrome defined by urinary urgency, with or without urgency urinary incontinence (UUI), usually with increased daytime frequency and nocturia. Despite observed links between interstitial cystitis/bladder pain syndrome, a diagnostically related counterpart to overactive bladder, and pelvic inflammatory disease, the direct relationship between PID and OAB remains unclear. This is a publication of the abstract and poster of this preliminary work that was presented at the 2025 TAFP Primary Care Summit.

Objectives

Determine the association between pelvic inflammatory disease and overactive bladder using data from the National Health and Nutrition Examination Survey (NHANES) database.

Methods

Descriptive analysis was performed using chi-square analyses. Additionally, a univariate and a multivariate logistic regression was performed. The threshold for significance was set to a p-value of less than 0.05. All analysis was performed using R statistical analysis software with the “svy” package.

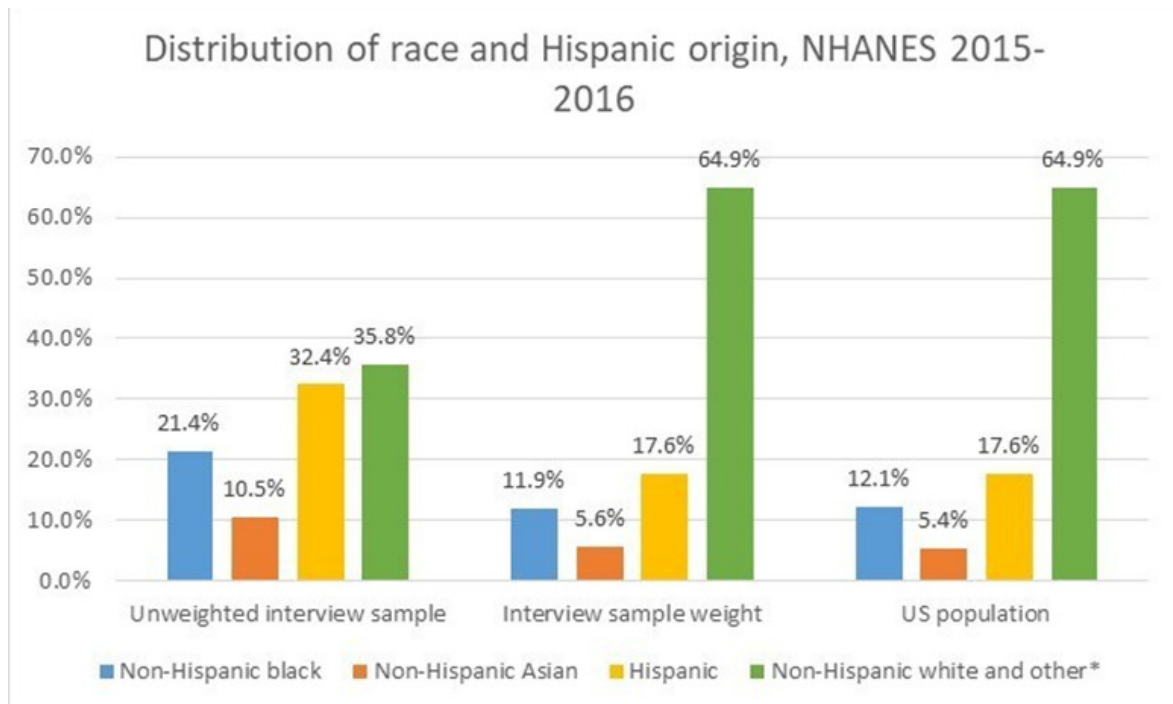


Figure 1. Graph Comparing NHANES Unweighted Interview Sample, Weighted Interview Sample, and U.S. Population for 2015-2016

NHANES Questionnaire	OABSS Score
Urge urinary incontinence frequency	Urge urinary incontinence score
Never	0
Less than once a month	1
A few times a month	1
A few times a week	2
Every day or night	3
Nocturia frequency	Nocturia score
0	0
1	1
2	2
3	3
4	3
5 or more	3

*This table was adapted from a study by Zhu et al. A score of 3 or higher qualifies as OAB.

Table 1. Symptom Frequencies in NHANES and OABSS Score

Results

Our analysis encompassed a number of samples representative of 41,487,108 individuals in the US population. Our findings showed that women who responded as having had a history of PID were more prone to urinary issues including leakage during physical activities ($p = 0.002$), leakage before

reaching the toilet ($p = 0.004$), bothersome leakage ($p = 0.014$), impact on daily activities due to leakage ($p = 0.003$), and increased nocturnal urination ($p = 0.002$). A history of PID was associated with a 1.07x increased odds of having OAB ($p = 0.003$) even when controlling for age, race, and education.

Questionnaire Item	Response Options	History of PID <i>n</i> = 2,038,703	No History of PID <i>n</i> = 39,448,405	Total Cohort <i>n</i> = 41,487,108	p-value
How often do you have urinary leakage?	Never	939,602 (46%)	24,511,005 (62%)	25,450,607 (61%)	0.002
	Less than once a month	364,718 (18%)	7,537,639 (19%)	7,902,356 (19%)	
	A few times a month	274,495 (13%)	4,070,552 (10%)	4,345,047 (10%)	
	A few times a week	196,267 (10%)	1,892,264 (5%)	2,088,531 (5%)	
	Every day and/or night	263,622 (13%)	1,358,767 (3%)	1,622,389 (4%)	
If you have leakage, how much urine do you lose each time?	Drops	780,533 (38%)	11,313,899 (29%)	12,094,433 (29%)	0.159
	Small splashes	261,307 (13%)	3,357,478 (9%)	3,618,786 (9%)	
	More	57,260 (3%)	187,844 (0%)	245,104 (1%)	
Do you leak urine during physical activities?	Yes	1,184,663 (58%)	14,249,570 (36%)	15,434,233 (37%)	0.002
	No	854,040 (42%)	25,120,657 (64%)	25,974,696 (63%)	
If so, how frequently do you leak urine during physical activity?	Less than once a month	656,968 (32%)	8,114,555 (21%)	8,771,523 (21%)	0.091
	A few times a month	128,075 (6%)	3,568,995 (9%)	3,697,070 (9%)	
	A few times a week	270,289 (13%)	1,941,791 (5%)	2,212,079 (5%)	
	Every day and/or night	109,067 (5%)	579,446 (1%)	688,513 (2%)	
Do you urinate before reaching the toilet?	Yes	528,261 (26%)	6,543,309 (17%)	7,071,569 (17%)	0.072
	No	1,510,442 (74%)	32,767,395 (83%)	34,277,837 (83%)	
If so, how frequently does urinating before reaching the toilet occur?	Less than once a month	192,632 (9%)	3,839,273 (10%)	4,031,905 (10%)	0.004
	A few times a month	92,877 (5%)	1,617,067 (4%)	1,709,943 (4%)	
	A few times a week	185,402 (9%)	1,008,678 (3%)	1,194,080 (3%)	
	Every day and/or night	57,350 (3%)	78,292 (0%)	135,641 (0%)	
Do you leak urine during non-physical activities?	Yes	215,032 (11%)	2,410,350 (6%)	2,625,382 (6%)	0.163
	No	1,823,670 (89%)	36,959,876 (94%)	38,783,546 (93%)	
If so, how frequently do you leak urine during non-physical activity?	Less than once a month	65,752 (3%)	1,093,121 (3%)	1,158,874 (3%)	0.141
	A few times a month	0 (0%)	648,024 (2%)	648,024 (2%)	
	A few times a week	98,305 (5%)	488,419 (1%)	586,724 (1%)	
	Every day and/or night	50,975 (3%)	180,786 (0%)	231,761 (1%)	
How much does urine leakage bother you?	Not at all	397,207 (19%)	6,359,667 (16%)	6,756,874 (16%)	0.014
	Only a little	356,528 (17%)	6,365,660 (16%)	6,722,188 (16%)	
	Somewhat	95,919 (5%)	2,805,775 (7%)	2,901,693 (7%)	
	Very much	205,735 (10%)	1,152,956 (3%)	1,358,691 (3%)	
	Greatly	237,832 (12%)	1,228,930 (3%)	1,466,761 (4%)	
How much are your daily activities affected by urine leakage?	Not at all	808,496 (40%)	14,259,474 (36%)	15,067,970 (36%)	0.003
	Only a little	263,103 (13%)	1,932,389 (5%)	2,195,493 (5%)	
	Somewhat	98,712 (5%)	1,294,424 (3%)	1,393,136 (3%)	
	Very much	122,908 (6%)	319,872 (1%)	442,780 (1%)	
	Greatly	0 (0%)	106,830 (0%)	106,830 (0%)	
How many times do you urinate in a night?	0	625,131 (31%)	14,632,173 (37%)	15,257,304 (37%)	0.002
	1	802,383 (39%)	16,130,338 (41%)	16,932,721 (41%)	
	2	176,749 (9%)	5,546,983 (14%)	5,723,732 (14%)	
	3	118,692 (6%)	1,649,307 (4%)	1,767,999 (4%)	
	4	76,349 (4%)	330,348 (1%)	406,696 (1%)	
	5 or more	239,399 (12%)	1,081,076 (3%)	1,320,476 (3%)	
Overactive Bladder*	No	1,441,081 (71%)	35,133,502 (89%)	36,574,583 (88%)	< 0.0001
	Yes	597,622 (29%)	4,314,903 (11%)	4,912,524 (12%)	

*diagnosed based on an OABSS Score of greater than 3

Table 2. Descriptive statistics from questionnaire adapted from NHANES 2017-2020

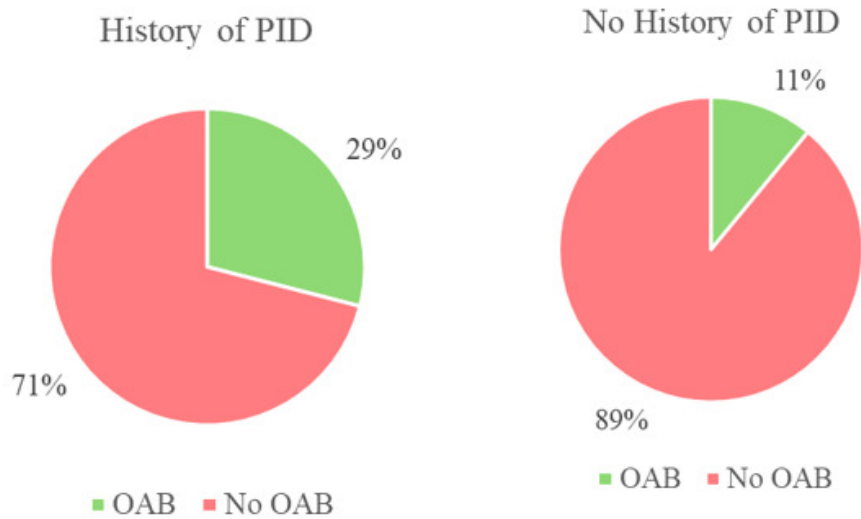


Figure 2a and 2b. PID and OAB Pie Charts

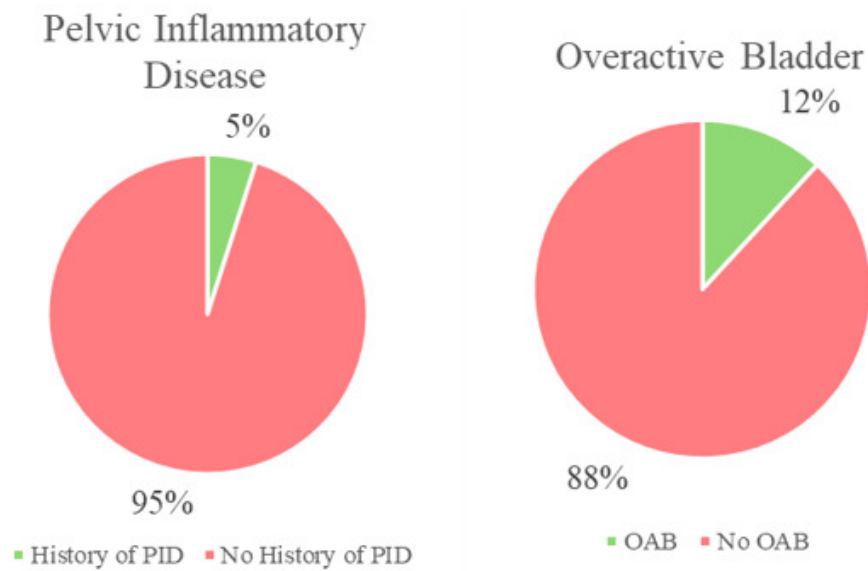


Figure 3a and 3b. PID and OAB Proportions

	Univariate		Multivariate	
	Odds Ratio (95% CI)	p-value	Odds Ratio (95% CI)	p-value
Age	1.00 (1.00 - 1.00)	0.004	1.00 (1.00 - 1.00)	0.002
White Race	0.99 (0.967 - 1.02)	0.566	1.00 (0.975 - 1.03)	0.862
Hispanic Race	0.98 (0.955 - 1.01)	0.204	0.97 (0.939 - 0.998)	0.034
Black Race	1.01 (0.978 - 1.03)	0.681	1.00 (0.970 - 1.03)	0.909
Asian Race	0.99 (0.958 - 1.02)	0.541	0.97 (0.891 - 1.07)	0.569
Other Race	1.11 (1.00 - 1.24)	0.048	1.10 (0.992 - 1.22)	0.070
Overactive Bladder	1.09 (1.03 - 1.15)	0.003	1.07 (1.01 - 1.13)	0.018

*No History of PID is the reference, multivariate is controlled for age, race, and education

Table 3. Logistic regression model for PID and OAB

Conclusion

Even when accounting for risk factors, there is a significant relationship between overactive bladder and prior reported history of pelvic inflammatory disease. This study is limited in its cross-sectional design and therefore, additional studies are required to investigate the connection between PID and OAB and its potential causes. In addition, as mentioned, this is preliminary work that was presented at the 2025 TAFP Primary Care Summit.

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