PAIN

Provoked Vestibulodynia in Women with Pelvic Pain

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ABSTRACT

Introduction: Pelvic pain and vulvar pain are common conditions in women. In this study, we sought to characterize the clinical picture of patients with concurrent pelvic pain and provoked vestibulodynia (PVD).

Aim: To analyze the association between sexual/clinical characteristics and a diagnosis of PVD among women with pelvic pain.

Methods: Cross-sectional analysis of a prospective registry at a tertiary referral center for pelvic pain and endometriosis, involving consecutive non-menopausal sexually active patients 18−49 years-old seen by a single gynecologist from January 2016−December 2017. The sample was divided into 2 groups: pelvic pain with PVD; and pelvic pain alone (without PVD).

Main Outcome Measures: Superficial dyspareunia and deep dyspareunia on a 11-point numeric rating scale, and the sexual quality-of-life subscale of the Endometriosis Health Profile-30 (0−100%).

Results: There were 129 patients that met study criteria: one third with pelvic pain and PVD (n = 42) and two-thirds with pelvic pain alone (without PVD) (n = 87). Women with pelvic pain and PVD had significantly more severe superficial dyspareunia ≥7/10 (OR = 12.00 (4.48−32.16), $P < .001$), more severe deep dyspareunia ≥7/10 (OR = 4.08 (1.83−9.10), $P = .001$), and poorer sexual quality of life (Endometriosis Health Profile-30 ≥50%) (OR = 4.39 (1.67-11.57), $P = .002$), compared with the group with pelvic pain alone. Women with pelvic pain and PVD also had more anxiety, depression, and catastrophizing, more frequent tenderness of the bladder and pelvic floor, and more common diagnosis of painful bladder syndrome. On the other hand, there were no significant differences between the 2 groups in terms of dysmenorrhea, chronic pelvic pain, abdominal wall allodynia, positive Carnett test for abdominal wall pain, functional quality of life, endometriosis, and irritable bowel syndrome.

Conclusions: In the pelvic pain population, PVD may be associated with more negative impact on dyspareunia, sexual quality of life, and bladder/pelvic floor function, but it may not significantly impact abdominopelvic pain or day-to-day function in general. **Bao C, Noga H, Allaire C, et al. Provoked Vestibulodynia in Women with Pelvic Pain. Sex Med 2019;7:227−234.**

Key Words: Dyspareunia; Vestibulodynia; Vulvodynia; Pelvic Pain; Endometriosis; Painful Bladder Syndrome; Pelvic Floor

INTRODUCTION

Pelvic pain in women is located in the lower abdomen (but above the symphysis pubis and pelvic girdle) and is heterogeneous in cause and presentation. It may be associated with musculoskeletal, neurologic, gastrointestinal, urologic, or gynecologic causes.[1] These causes include myofascial pelvic pain, neuropathies, irritable bowel syndrome, painful bladder syndrome, and endometriosis. It is not uncommon for multiple comorbidities to be present in single patient with chronic pelvic pain. Pelvic pain can also impact sexual function through the symptom of pain with deep penetration (deep dyspareunia).

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Vulvar pain is another type of gynecologic pain (below the symphysis pubis) and has been classified as (i) vulvar pain caused by a specific disorder or (ii) vulvodynia—vulvar pain of at least 3 months' duration, without clear identifiable cause.[2] Vulvodynia itself further encompasses a spectrum of clinical manifestations, with provoked vestibulodynia (PVD) being the most investigated subtype.[3] PVD is defined as a vulvodynia that is (i) provoked and (ii) localized to the vulvar vestibule,[2] and leads to introital pain with penetration (superficial dyspareunia). Both superficial and deep dyspareunia are included in the DSM5 criteria for genito-pelvic pain penetration disorder, which is inclusive of pelvic or vulvovaginal pain with attempted intercourse.[4]

The superficial dyspareunia associated with PVD results in negative impacts on sexual functioning, including decreased sexual desire and arousal and lower levels of sexual satisfaction, and can impact quality of life.[5–7] Women with PVD also report higher levels of psychological distress, anxiety, somatization, and pain catastrophizing compared with healthy control women.[3,8,9]

As with many pain conditions, PVD does not always occur in isolation and can be present with other types of pain conditions.[10–13] Research is needed to determine how a comorbid diagnosis of PVD affects pain symptoms, psychological functioning, and quality of life in women with other chronic pain conditions. Among women with superficial dyspareunia, a diagnosis of PVD was associated with more pain during and after intercourse, higher levels of pain catastrophizing, and more severe pain on vulvar touch and finger insertion, as compared to women with superficial dyspareunia but without PVD.[14] These findings suggest that the presence of PVD may be a marker of amplification of central nervous system pain pathways.[3,15–17]

In this study, our objective was to investigate the impact of comorbid PVD in women attending a tertiary referral center for pelvic pain. We expected that comorbid PVD would be associated with worse dyspareunia (superficial or deep)[18] and worse sexual quality of life. However, we also hypothesized that PVD (as a possible marker of amplification of central pain pathways) could have implications beyond the vulvovaginal region, including potential associations with more severe pelvic pain, more abdominopelvic physical examination findings, and more impact on day-to-day function.

MATERIALS AND METHODS

Procedures and Inclusion/Exclusion Criteria

This study involved the analysis of cross-sectional data from a prospective data registry at an academic tertiary referral program for pelvic pain, which is registered on ClinicalTrials.gov (NCT02911090) and received institutional research ethics approval (H16-02903). The prospective informed consent of patients and real-time data collection procedure have been described previously.[16] In brief, patients complete online questionnaires before the gynecologist visit, followed by real-time data entry by the gynecologist during the assessment that captures the physical examination, elements from chart review, and the impression and plan.

For this study, we included consecutive referrals seen by the study gynecologist (PY) for pelvic pain from January 2016—December 2017, who were between 18—49 years of age at the time of completing the intake questionnaires for the registry. An inclusive definition of pelvic pain was used, defined as any degree of dysmenorrhea, deep dyspareunia, dyschezia, chronic pelvic pain, back pain, or diagnosed or suspected endometriosis. Participants were excluded from the study if they were postmenopausal or had never been sexually active (as self-defined by the patient).

The participants were divided into 2 groups: (i) those with pelvic pain and PVD; and (ii) those with pelvic pain alone (without PVD). We were unable to stratify by underlying cause of pelvic pain, because of limitations in sample size. Furthermore, we only considered PVD because other types of vulvar pain (eg, spontaneous or unprovoked vulvodynia) are very rare in our population.

PVD was diagnosed if a participant rated superficial dyspareunia (pain with initial penetration during sexual activity, not exclusive to intercourse) as $\geq$4/10 on the intake baseline questionnaire and had a positive cotton swab (Q-tip) test during the gynecologic assessment.[3] Q-tip palpation for tenderness of the vulvar vestibule was performed on each patient at the 12-, 2-, 4-, 6-, 8-, and 10-o'clock positions, after ruling out the presence of a vulvar dermatosis by visual inspection. The examiner (P.Y.) was previously trained in the use of a vulvalgesiometer[19] at a multidisciplinary vulvodynia clinic, to palpate with a Q-tip at a fixed pressure of 30 g.[3] With each Q-tip palpation, the participant was asked whether she experienced pain (yes/no). In the registry, the presence of any tenderness for $\geq$1 site was coded as a positive Q-tip test result. Participants who did not meet both of the above criteria for PVD (ie, superficial dyspareunia $\geq$4/10 and positive Q-tip test) were considered to have pelvic pain alone (ie, without PVD).

Analyses and Measures

After description of the participants' demographic characteristics, we compared the 2 groups (pelvic pain and PVD vs pelvic pain alone without PVD) for (i) sexual measures (eg, superficial and deep dyspareunia, and sexual quality of life) and (ii) other measures, including psychological questionnaires, physical examination findings, other types of pelvic pain, and other pain diagnoses.

Sexual measures included superficial dyspareunia severity and deep dyspareunia severity each on an 11-point numeric rating scale (0—10), where 0 refers to "no pain" and 10 to "worst pain imaginable." Our ad hoc dyspareunia questions asked about pain with any sexual activity (not exclusive to intercourse). Another sexual measure was sexual quality of life, assessed by the Endometriosis Health Profile-30 (EHP-30) sexual intercourse modular subscale (0—100%, with 100% indicating worse sexual

Table 1. Demographic characteristics of women with pelvic pain and concurrent provoked vestibulodynia (PVD) (n = 42) vs women with pelvic pain alone (no PVD) (n = 87)

	Women with pelvic pain (n = 129)		
Variables	No PVD (n = 87)	PVD (n = 42)	*P* value
Age (y), mean ± SD	32.8 ± 7.1	32.7 ± 7.2	.95
Body mass index (kg/m^2), mean ± SD	25.0 ± 5.5	25.3 ± 6.1	.95
Caucasian ethnicity	65 (75%)	31 (74%)	1.00
Heterosexual orientation	79 (91%)	40 (95%)	.50
Smokes	8 (9.2%)	8 (19%)	.15
Married	48 (55%)	20 (48%)	.46
Nulligravid	35 (40%)	17 (41%)	1.00
Using hormonal suppression	26 (30%)	15 (36%)	.55
Education attained			.38
Some high school	3 (3.4%)	4 (9.5%)	
Graduated high school/earned GED	7 (8.0%)	3 (7.1%)	
Some college	17 (20%)	9 (21%)	
Graduated 2-year college	10 (12%)	7 (17%)	
Graduated 4-year college	27 (31%)	7 (17%)	
Postgraduate degree	22 (25%)	10 (24%)	
Other	1 (1.1%)	2 (4.8%)	
Annual household income			0.59
<$20,000	10 (12%)	8 (19%)	
$20,000–$39,999	10 (12%)	6 (14%)	
$40,000–$59,999	19 (22%)	5 (12%)	
$60,000–$79,999	8 (9.2%)	6 (14%)	
$80,000–$99.999	15 (17%)	6 (14%)	
≥$100,000	25 (29%)	11 (26%)	

quality of life), which assesses pain with intercourse, avoidance of intercourse, and feelings of worry, guilt, and frustration regarding intercourse.[20,21] Although our dyspareunia questions referred to any sexual activity, the EHP-30 wording specifically uses the term "intercourse." It should be noted that the EHP-30 has been validated for endometriosis but not for other pelvic or vulvar pain conditions. Other measures were previously described in the registry: psychological questionnaires, including the Generalized Anxiety Disorder 7-Item Scale,[22] Patient Health Questionnaire–9 for depression,[23] and the Pain Catastrophizing Scale[24]; physical examination variables, including tenderness of the bladder or pelvic floor (levator ani) on pelvic examination, as well as abdominal wall allodynia and abdominal wall pain typically caused by myofascial trigger points diagnosed by a positive Carnett test result (abdominal tenderness worsening with contraction of abdominal wall musculature)[25]; other types of pelvic pain, including dysmenorrhea, chronic pelvic pain, dyschezia, and back pain, each on an 11-point numeric rating scale (0 or no pain, to 10 or worst pain imaginable), as well as the functional pain quality-of-life subscale of the EHP-30 that assessed day-to-day activities such as ability to stand, sit, or walk, or to do social or leisure activities (0–100%, with 100% indicating worse functional quality of life); [20,21] and comorbid pain diagnoses, including endometriosis, irritable bowel syndrome, and painful bladder syndrome, using standardized criteria as previously published.[25]

For the 0–10 scales and the validated questionnaires, the data were categorized into the following binary variables: severe pain (≥7/10) vs mild-moderate pain (<7/10) for the pain scores; ≥50% vs >50% for the EHP-30 sex subscale and EHP-30 functional pain subscale; moderate symptoms (≥10) vs mild symptoms (<10) for the Patient Health Questionnaire–9 and Generalized Anxiety Disorder 7-Item Scale ; and ≥75% percentile (≥30) vs <75% centile (<30) for the Pain Catastrophizing Scale.[22–24,26] Categorization was performed to allow calculation of odds ratios (OR) with 95% confidence intervals. In corollary analyses, these variables were also analyzed when left as continuous.

For comparison between the 2 groups (pelvic pain and PVD vs pelvic pain alone without PVD), bivariate associations were tested using Fisher's exact test for binary variables and the Mann-Whitney test for continuous variables. The statistical significance level was set at $P < .05$ (2-tailed). Effect sizes were calculated using Cohen's h for proportional data and Cohen's d for

Table 2. Sexual and other outcomes in women with pelvic pain and concurrent provoked vestibulodynia (PVD) (n = 42) vs women with pelvic pain alone (no PVD) (n = 87)

	Women with pelvic pain (n = 129)				
Outcomes	No PVD (n = 87)	PVD (n = 42)	OR, 95% CI	*P* value (Fisher)	Cohen's h
Sexual measures					
Superficial dyspareunia ≥7/10	7 (8%)	21 (51%)	12.00 (4.48–32.16)	<.001	1.02
Deep dyspareunia ≥7/10	32 (37%)	29 (71%)	4.08 (1.83–9.10)	.001	0.70
Sexual quality-of-life subscale of the EHP ≥50%	29 (47%)*	27 (79%)*	4.39 (1.67–11.57)	.002	0.68
Psychological measures					
PHQ-9 ≥10 (moderate)	23 (26%)	22 (52%)	3.06 (1.42–6.61)	.006	0.54
GAD-7 ≥10 (moderate)	13 (15%)	14 (33%)	2.85 (1.19–6.80)	.021	0.43
PCS ≥75% centile	10 (12%)	14 (33%)	3.85 (1.54–9.66)	.007	0.52
Physical examination findings					
Abdominal cutaneous allodynia	14 (16%)	11 (26%)	1.85 (0.76–4.53)	.23	0.25
Abdominal wall pain (positive Carnett)	27 (31%)	17 (41%)	1.51 (0.70–3.25)	.33	0.21
Bladder tenderness	24 (28%)	22 (52%)	2.89 (1.34–6.22)	.010	0.50
Pelvic floor tenderness	28 (32%)	25 (60%)	3.10 (1.45–6.65)	.004	0.57
Other pain scores					
Dysmenorrhea ≥7/10	44 (56%)†	23 (62%)†	1.31 (0.59–2.91)	.55	0.12
Chronic pelvic pain ≥7/10	38 (44%)	26 (62%)	2.10 (0.99–4.45)	.06	0.36
Dyschezia ≥7/10	20 (23%)	16 (38%)	2.06 (0.93-4.58)	.09	0.33
Back pain ≥7/10	28 (32%)	19 (45%)	1.74 (0.82–3.71)	.17	0.27
Functional quality-of-life subscale of the EHP ≥50%	43 (49%)	27 (64%)	1.84 (0.86–3.93)	.13	0.30
Other pain conditions					
Endometriosis				.33	
Surgically confirmed	26 (30%)	14 (33%)	0.70 (0.25–2.00)‡		0.07
Clinically suspected	48 (55%)	18 (43%)	0.49 (0.25–2.00)‡		0.24
Absent	13 (15%)	10 (24%)	Reference		
Irritable bowel syndrome	39 (45%)	23 (55%)	1.49 (0.71–3.12)	.35	0.20
Painful bladder syndrome	28 (32%)	25 (60%)	3.10 (1.45–6.65)	.004	0.57

EHP = Endometriosis Health Profile; GAD-7 = Generalized Anxiety Disorder 7-Item Scale; OR = odds ratio; PCS = Pain Catastrophizing Scale; PHQ-9 = Patient Health Questionnaire.
*N = 62 and N = 34 informative cases, respectively. Higher scores indicate poorer sexual quality of life.
†Among women currently having menstrual periods: N = 79, and N = 37, respectively.
‡Compared with "absent."

continuous data, where 0.20 is a small effect size, 0.50 is a medium effect size, and 0.80 is a large effect size.[27] Missing data were excluded. Statistical analyses were performed using IBM SPSS Statistics for Windows Version 24 (IBM Corp, Armonk, NY, USA).

RESULTS

Participant Characteristics

After the application of inclusion and exclusion criteria (see Supplementary material), 129 women qualified for the final analysis: 42 (33%) had pelvic pain and PVD, and 87 (67%) had pelvic pain alone (ie, no PVD). Demographic characteristics of the 2 groups are shown in Table 1 and did not significantly differ between the groups. In particular, there were no differences in age, body mass index, ethnicity, sexual orientation, smoking, marital status, parity, current use of hormonal suppression medications, education, or income. Notably, of the total sample, 31% (41/129) had a history of confirmed endometriosis, 40% (51/129) were clinically suspected to have endometriosis, and, in the remaining 18% (23/129), endometriosis was absent or not clinically suspected, with no differences between the 2 groups (Table 2).

Sexual Measures

Table 2 shows the ORs for the sexual measures, when the group with pelvic pain and PVD was compared to the group with pelvic pain alone (without PVD). Women with pelvic pain and PVD had significantly more severe superficial dyspareunia ≥7/10 (OR = 12.00 [4.48–32.16], $P < .001$; Cohen's h = 1.02). In addition, women with pelvic pain and PVD had significantly more severe deep dyspareunia ≥7/10 (OR = 4.08

Table 3. Sexual and other outcomes (mean scores) in women with pelvic pain and concurrent provoked vestibulodynia (PVD) (n = 42) vs women with pelvic pain alone (no PVD) (n = 87)

	Women with pelvic pain (n = 129)			
Outcomes	No PVD (n = 87) Mean ± SD	PVD (n = 42) Mean ± SD	*P* value	Cohen's d
Sexual measures				
Superficial dyspareunia (0–10)	1.9 ± 2.5	6.7 ± 1.9	<.001	2.16
Deep dyspareunia (0–10)	5.0 ± 3.2	7.2 ± 2.7	<.001	0.74
Sexual quality-of-life subscale of the EHP (0–100%)	45% ± 33%*	66% ± 25%*	.004	0.72
Psychological measures				
Depression, PHQ-9 (0–27)	7.0 ± 6.1	11.2 ± 7.3	.001	0.62
Anxiety, GAD-7 (0–21)	5.3 ± 5.3	8.3 ± 5.9	.003	0.53
PCS (0–52)	15.8 ± 12.1	23.0 ± 13.3	.003	0.57
Other pain scores				
Dysmenorrhea (0–10)	5.9 ± 3.2†	6.2 ± 3.3†	.52	0.09
Chronic pelvic pain (0–10)	5.3 ± 3.3	6.5 ± 3.1	.051	0.37
Dyschezia (0–10)	3.5 ± 3.1	4.9 ± 2.8	.013	0.47
Back pain (0–10)	4.6 ± 3.0	5.6 ± 3.2	.10	0.32
Functional pain quality-of-life subscale of the EHP (0–100%)	47% ± 26%	55% ± 24%	.08	0.32

EHP = Endometriosis Health Profile; GAD-7 = Generalized Anxiety Disorder 7-Item Scale; PCS = Pain Catastrophizing Scale; PHQ-9 = Patient Health Questionnaire.
*N = 62 and N = 34 informative cases, respectively. Higher scores indicate poorer sexual quality of life.
†Among women currently having menstrual periods: N = 79, and N = 37, respectively.

[1.83–9.10], $P = .001$; Cohen's h = 0.70), and poorer sexual quality of life as measured by the EHP sex subscale ≥ 50% (OR = 4.39 [1.67–11.57], $P = .002$; Cohen's h = 0.68).

Other Measures

Table 2 also shows the ORs for the other measures (eg, psychological, physical examination, other pain scores, and other pain diagnoses), when the group with pelvic pain and PVD was compared with the group with pelvic pain alone (without PVD). Women with pelvic pain and PVD were significantly more likely to have moderate or greater depression symptoms (OR = 3.06 [1.42–6.61], $P = .006$; Cohen's h = 0.54), moderate or greater anxiety (OR = 2.85 [1.19–6.80], $P = .021$; Cohen's h = 0.43), and catastrophizing ≥75th centile (OR = 3.85 [1.54–9.66], $P = .007$; Cohen's h = 0.52) (Table 2). On physical examination, women with pelvic pain and PVD were significantly more likely to have tenderness of the bladder (OR = 2.89 [1.34–6.22], $P = .010$; Cohen's h = 0.50) and pelvic floor (OR = 3.10 [1.45–6.65], $P = .004$; Cohen's h = 0.57), but there were no differences in abdominal wall allodynia or abdominal wall pain diagnosed with a positive Carnett test result (Table 2).

For other pain scores, women with pelvic pain and PVD and women with pelvic pain alone (without PVD) had similar severities of other types of pelvic pain (dysmenorrhea, chronic pelvic pain, dyschezia, back pain) and similar functional quality of life (EHP functional pain subscale) (Table 2). In terms of other pain diagnoses, women with pelvic pain and PVD were significantly more likely to have painful bladder syndrome (OR = 3.10 [1.45–6.65], $P = .004$; Cohen's h = 0.57), but there were no differences for irritable bowel syndrome or endometriosis (Table 2).

Corollary Analyses

Table 3 shows the same analyses as Table 2, but with measures left as continuous variables (eg, 0–10 scale without categorization). The findings were the same as in Table 2, except women with pelvic pain and PVD additionally had higher mean dyschezia ($P = .013$).

DISCUSSION

In this study of a prospective registry at a tertiary referral center for women with pelvic pain, a comorbid diagnosis of PVD was present in one-third of patients. Having a comorbid PVD diagnosis was associated with sexual variables (superficial and deep dyspareunia, and sexual quality of life), as well as bladder and pelvic floor tenderness on examination and a diagnosis of painful bladder syndrome. The latter is consistent with previous work showing an association between PVD and bladder neck tenderness,[28] as well as between PVD and painful bladder syndrome.[12,18] A comorbid PVD diagnosis was also associated with more severe psychological symptoms, including being ~3 times more likely as women with pelvic pain alone (without PVD) to have moderate depressive and anxiety symptoms, as well as higher levels of pain catastrophizing. This aligns with previous research demonstrating significant psychological comorbidities in

women with PVD.[5,29,30] These findings were all associated with moderate-to-large effect sizes (0.43-1.02), suggesting clinically significant associations.

In contrast, PVD was not clearly associated with abdominal examination findings (cutaneous allodynia or abdominal wall pain diagnosed by positive Carnett test result), other types of pelvic pain (dysmenorrhea, chronic pelvic pain, back pain), functional quality of life (performance of day-to-day activities), or other pelvic pain diagnoses (irritable bowel syndrome, endometriosis). The 1 exception was an association between PVD and dyschezia that was statistically significant when using the continuous 0−10 scale; this finding could be related to the pelvic floor dysfunction characteristic of PVD, because the levator ani also provides support to the rectum.

Together the findings suggest that the relevance of PVD in women with pelvic pain is primarily with respect to vulvovaginal pain, sexual quality of life, and psychological health, rather than abdominopelvic pain and day-to-day functional quality of life. In other words, there appears to be a specificity of the clinical significance of PVD in the pelvic pain population, whereby having PVD is associated with increased likelihood of experiencing sexual and psychological sequelae but not other types of pelvic pain or functional impairment.

As expected, women with PVD had more severe superficial dyspareunia. However, women with PVD were also found to have more-severe deep dyspareunia. We propose that the relationship between PVD and deep dyspareunia is mediated by the observed associations between PVD and bladder/pelvic floor (levator) tenderness and between PVD and painful bladder syndrome. For example, we have previously found bladder/pelvic floor (levator) tenderness and painful bladder syndrome to be associated with deep dyspareunia.[31−33] It may be that contact with a tender bladder or tender levator ani during deep penetration leads to deep dyspareunia.

A possible explanation may be cross-sensitization, whereby a symptomatic (eg, painful) organ/structure leads to other symptomatic organ/structures through convergence and subsequent cross-talk of afferent signals within the spinal cord.[34] Cross-sensitization can result in viscero-visceral convergence (eg, a symptomatic vestibule converging with a symptomatic bladder, or vice versa), or viscero-somatic convergence (eg, a symptomatic vestibule converging with a symptomatic pelvic floor or vice versa).[34] This cross-sensitization may account for the associations observed between PVD and bladder/pelvic floor tenderness and between PVD and painful bladder syndrome. On the other hand, we did not find associations between PVD and irritable bowel syndrome or between PVD and abdominal examination findings or chronic pelvic pain. Thus, it appears that viscero-visceral convergence between the vestibule and bowel, and viscero-somatic convergence between the vestibule and abdominal wall, are not occurring to a significant extent in our pelvic pain population.

Strengths of this study include the use of a registry of prospectively consented patients, and the inclusion of physical examination findings and validated questionnaires in addition to pain severity scores. Limitations include the fact that degree of tenderness on Q-tip palpation of the vestibule or number of tender sites were not coded into the registry, and the study involved a single examiner who was not blinded to patient symptoms. It is important that a future blinded prospective trial be performed to validate these results. On the other hand, Q-tip palpation of the vestibule was performed in consecutive patients, without regard to the patient presentation. Furthermore, there is also some literature on the limitations of the Q-tip test as a marker of PVD, because there can be Q-tip tenderness of the vulvar vestibule in a small proportion of asymptomatic women.[35] Another limitation was the small number of women identifying as non-heterosexual. Given that they may be engaging in sexual activities other than vaginal penetration, their experiences of comorbid PVD may be different from those of women in opposite-sex relationships. Future research should aim to systematically capture the types of sexual activities participants are engaging in and ask participants to self-report pain according to particular behaviors. Finally, we did not have the sample size to stratify the sample by different underlying causes of pelvic pain, nor do we currently have longitudinal data on this cohort to determine whether PVD is associated with a different prognosis.

Clinically, this study's findings suggest that a PVD diagnosis in patients with pelvic pain may mostly serve as a marker of sexual pain. We propose that screening for PVD be performed in the pelvic pain population, even if superficial dyspareunia is not the primary complaint, because PVD may be a marker of poorer sexual quality of life and was also associated with worse deep dyspareunia. Therefore, it may be that in women with pelvic pain and PVD, more intensive multidisciplinary treatment of dyspareunia may be required, such as medical, surgical, psychological, or physical therapy approaches,[36] compared to women with pelvic pain without PVD.

In future research, other measures of sexual function (assessing factors such as desire, arousal, and orgasm) or sexual distress, beyond the EHP-30, should be explored in this population. We are also interested in how patients and physicians compare in their conceptualization of "deep" vs "superficial" dyspareunia. Also of interest is the observed association between PVD and more severe depression, anxiety, and pain catastrophizing. The much higher levels of psychological symptoms in women with pelvic pain and PVD may be a consequence of their higher sexual pain experiences. It may also be the case, however, that pre-existing symptoms of depression and anxiety may make women more vulnerable to developing both pelvic pain and PVD. For example, there is strong evidence that a history of

pre-existing depression and anxiety increases vulnerability of developing vulvodynia.[37] Finally, in future research, the findings need to be validated at other centers to demonstrate generalizability.

CONCLUSION

In conclusion, women affected by PVD in addition to pelvic pain experienced more severe superficial and deep dyspareunia, with an impairment in sexual quality of life, and were also more likely to have a diagnosis of painful bladder syndrome, to have a tender bladder and pelvic floor, and to have more psychological symptomatology. Therefore, in women with pelvic pain, a diagnosis of PVD may indicate more negative impact on sexual and mental health, which in turn may require more intensive and multidisciplinary management.

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Category 3

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SUPPLEMENTARY DATA

Supplementary data related to this article can be found at https://doi.org/10.1016/j.esxm.2019.03.002.