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Provoked Vestibulodynia: Does Pain Intensity Correlate With Sexual Dysfunction and Dissatisfaction?

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ABSTRACT

Introduction: Provoked vestibulodynia (PVD) is suspected to be the most frequent cause of vulvodynia in premenopausal women. Previous research has been inconclusive as to whether higher vulvovaginal pain ratings are associated with lower sexual function and satisfaction in women with PVD. Whether pain intensity correlates with sexual impairment is an important question given its implications for treatment recommendations.

Aim: To examine the associations among self-reported and objective pain measurements, sexual function, and sexual satisfaction in a large combined clinical and community sample of premenopausal women diagnosed with PVD.

Methods: Ninety-eight women with PVD underwent a cotton-swab test, a vestibular friction pain measurement, and a vestibular pressure-pain threshold measurement. In addition to sociodemographics, participants completed measurements of pain, sexual function, and sexual satisfaction.

Main Outcome Measures: Self-report measurements were the pain numerical rating scale (0−10), the McGill-Melzack Pain Questionnaire, the Female Sexual Function Index, and the Global Measure of Sexual Satisfaction. Objective measurements were pain during a cotton-swab test, pain during a vestibular friction procedure, and the vestibular pressure-pain threshold measurement.

Results: Age and relationship duration were significantly correlated with the Female Sexual Function Index total score ($r = -0.31$, $P < .01$; and $r = -0.22$, $P < .05$, respectively). When controlling for age, intercourse-related pain intensity, pain during the cotton-swab test, pain during vestibular friction, the vestibular pressure-pain threshold, and the McGill-Melzack Pain Questionnaire sensory and affective subscale scores were not significantly associated with sexual function and satisfaction in women with PVD.

Conclusion: The findings show that in women with PVD, self-report and objective pain ratings are not associated with sexual function and satisfaction. The results support the biopsychosocial nature of PVD and underscore the importance of a patient-focused multidisciplinary treatment approach for PVD

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Key Words: Provoked Vestibulodynia; Vulvodynia; Genital Pain; Dyspareunia; Sexual function; Sexual satisfaction

INTRODUCTION

Provoked vestibulodynia (PVD)—chronic, provoked, unexplained pain localized within the vulvar vestibule—is a major health concern for women of all ages.[1] Its prevalence is 8% in community samples and its incidence is increasing in young women.[2] Vulvovaginal pain and impaired sexual function are the two most notable symptoms of PVD that prompt women to seek care.[3] In particular, women with PVD have lower sexual desire and arousal, more difficulties with orgasm, decreased frequency of intercourse, and decreased sexual satisfaction compared with controls.[4-6] There is a largely untested assumption that the degree of sexual dysfunction and dissatisfaction is strongly associated with vulvovaginal pain intensity in women with PVD. However, if they are not associated, then this discrepancy could have important implications for treatment: it would suggest that simply treating the pain would not be sufficient to resolve patients' sexual dysfunction and dissatisfaction.

Few studies have examined the association between pain outcomes and women's sexual functioning, and when investigated,

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inconsistent findings have been reported. In a cross-sectional study of 17 women with PVD, Smith et al[7] reported that higher intercourse-related pain intensity was related to lower levels of sexual function and satisfaction. In contrast, a clinical-based study comparing the psychosexual characteristics of women with primary vs secondary PVD found that pain intensity during penetrative attempts was negatively correlated with sexual desire and lubrication, but not with arousal, satisfaction, and overall sexual function.[8] The latter results are in line with those of three other studies showing no correlation between intercourse-related pain intensity and overall sexual functioning in women with PVD.[9-11] A randomized trial of 78 women with PVD showed that decreasing the intercourse-related pain intensity does not necessarily lead to restoration of sexual function.[12] However, most of these studies relied on retrospective self-reports of pain during intercourse.

Although self-report measurements are widely used for the assessment of chronic pain, they are limited by the fact that they are retrospective and represent an average over time. Quantitative sensory testing (QST) of vulvar pain sensitivity can be used to assess pain in real time, and previous studies have shown lower pain thresholds in the vestibular mucosa of patients with PVD compared with unaffected women.[13,14] However, only two studies have examined the association between a laboratory-induced pain response and sexual function of women with PVD.[7,15] Smith et al[7] reported that neither pain intensity ratings during the cotton-swab test nor vulvar pressure-pain threshold was significantly correlated with sexual function and satisfaction. Consistent with the latter results, in a cross-sectional study of 25 women with PVD, Sutton et al[15] reported that pain intensity ratings during the cotton-swab test and vestibular pressure-pain and heat-pain thresholds were not significantly related to sexual function. However, these studies included small samples, limiting the conclusions that can be drawn.

Research on the association between pain outcomes and sexual function in PVD has focused mainly on the sensory component of pain, when in fact pain is defined as a multidimensional phenomenon with sensory and affective dimensions, namely the unpleasantness of the pain or the negative emotions it evokes.[16] Support for the distinction between the two pain components has been reported in women with PVD based on studies using QST methods: women with PVD reported higher levels of distress for equally painful vulvar[14] and non-vulvar[17] stimulation compared with control women. Two small studies have combined pain and unpleasantness ratings obtained during QST into an overall subjective pain rating (SPR) score, with one set of results indicating no significant correlations between the SPR and measurements of sexual function and satisfaction[7] and the other showing an association with lower sexual function.[15]

The available literature on the association between pain outcomes and sexual impairment in women with PVD has generated conflicting data. This pattern could be due, in part, to the fact that most studies have been restricted by the use of small, often exclusively clinical samples and are characterized by a partial measurement of the pain experience, often relying on retrospective self-report. Most research has focused on the association between pain and sexual function, leaving sexual satisfaction unaddressed. Whether pain intensity correlates with sexual impairment is an important question given its implications for treatment recommendations.

AIM

The aim of the present study was to examine associations among objectively measured and self-reported pain, sexual function, and sexual satisfaction in a large, combined clinical and community sample of premenopausal women with PVD. In addition to the use of self-report methods for the assessment of pain intensity and pain affect, pain during the cotton-swab test, during vestibular friction, and during QST was measured. We hypothesized that in women with PVD, pain ratings would not be significantly associated with sexual function or satisfaction.

METHODS

Participants

Potential participants were recruited from January 2003 to June 2007 through local media announcements and from gynecologist referrals, in the context of a randomized clinical trial. They were initially screened during a short preliminary telephone contact by a research assistant to determine their eligibility based on the selection criteria. The inclusion criteria were (i) pain during intercourse that was subjectively distressing and occurred at most (75%) intercourse attempts for at least 6 months (women who stopped attempting intercourse as a result of the pain were included if the pain could be confirmed during the gynecologic examination); (ii) pain limited to intercourse and other activities involving vestibular pressure (eg, bicycling); and (iii) moderate to severe pain in at least one location of the vestibule during the cotton-swab test, with a minimum average patient pain rating of 4 on an 11-point scale from 0 (no pain at all) to 10 (worst pain ever). Exclusion criteria were (i) unprovoked, chronic vulvovaginal pain; (ii) deep dyspareunia; (iii) presence of (a) major medical and/or psychiatric illness, (b) active infection, (c) dermatologic lesion, and/or (d) vaginismus; (iv) pregnancy; and (v) age younger than 18 or older than 45 years.

Procedure

The study was conducted in a university hospital in a large metropolitan area. Eligible women were invited to take part in an assessment at one of the two participating gynecologists' offices, where the study procedures were re-explained and then informed consent was obtained. Women underwent a gynecologic examination including a cotton-swab test, followed by a vestibular friction pain measurement and a pressure-pain threshold measurement. Women were given a questionnaire package that

included investigator-developed medical and pain history questionnaires and validated measurements assessing women's vulvovaginal pain, sexual function, and sexual satisfaction. The study was approved by the participating university hospital and university institutional review boards.

The following standardized protocol was used for the gynecologic examination: (i) careful inspection of the vulva to determine the presence of dermatologic, neoplastic, iatrogenic, and neurologic conditions; (ii) vaginal cultures to evaluate the presence of infections; (iii) a randomized cotton-swab palpation of three vestibular sites (3, 6, and 9 o'clock); and (iv) a standard gynecologic examination. In addition, any other physical findings were noted, as were the gynecologists' final diagnoses. Based on the combined results of this examination and participants' self-reported pain history, the gynecologists confirmed or disconfirmed women's eligibility to participate in the study. This procedure has shown substantial inter-rater reliability ($k = 0.68$) for the diagnosis of PVD and moderate test-retest reliability ($\kappa = 0.54$).[18]

MEASUREMENTS

Self-Report Measurements

Pain

Pain intensity was assessed using a numerical rating scale (NRS) by asking participants to estimate their average intercourse-related vulvovaginal pain during the past month (0 = no pain at all, 10 = worst pain ever). NRSs are widely used in chronic pain studies,[19] and they have good validity and reliability for assessing different types of pain.[20] They correlate well with other measurements of pain.[21] The McGill-Melzack Pain Questionnaire (MPQ)[22] was used to assess qualitative and quantitative aspects of pain. It consists of 77 adjectives, the summed scores of which yield three scales (sensory, evaluative, and affective) in addition to a total score, and three other indices (pain rating index, number of words chosen, and present pain index). High scores on this questionnaire indicate a more severe pain experience. This questionnaire has an excellent internal validity,[22] very good discriminant validity,[23] and good test-retest reliability for each measured dimension.[24]

Sexual Function and Satisfaction

Global sexual function was measured using the Female Sexual Function Index (FSFI).[25] The FSFI consists of 19 items focusing on the following dimensions of sexual function: desire, arousal, lubrication, orgasm, satisfaction, and pain or discomfort. Higher scores indicate better sexual function. The FSFI has very good psychometric qualities, is easy to administer, and discriminates clinical from non-clinical populations.[26] The Global Measure of Sexual Satisfaction (GMSEX)[27] was used to measure sexual satisfaction. The GMSEX is a five-item measurement that assesses satisfaction using a seven-point Likert scale. The total score ranges from 5 to 35, with higher scores corresponding to greater sexual satisfaction. The scale has good reliability and excellent validity.[28]

Objective Measurements

Pain During Cotton-Swab Test

During the gynecologic examination, a randomized cotton-swab palpation of three vestibular sites (3, 6, and 9 o'clock) was performed. Participants rated the pain at each site on an NRS of 0 (no pain at all) to 10 (worst pain ever), and the average pain rating was calculated to derive the vestibular pain index.[18]

Pain During Vestibular Friction Procedure

After the gynecologic examination, the posterior vestibule was gently rubbed with a dry cotton swab from the left to the right and back to create friction. Participants rated the resulting pain on an NRS of 0 (no pain at all) to 10 (worst pain ever). This assessment was conducted to assess the sensitivity of the entire vestibule to a dynamic stimulus.

Vestibular Pressure-Pain Threshold Measurement

Once participants reported that no residual pain sensations remained from the gynecologic examination procedures, vestibular pressure-pain threshold testing was initiated. The vulvalgesiometer[29] was applied to the vestibule at 3 o'clock. The lowest pressure level (ie, 3 g) was applied for 2 seconds. Then, consecutively higher levels were applied with an interstimulus interval of 10 seconds until pain was reported (ie, pain threshold). At pain threshold, participants rated the intensity and unpleasantness of the pain on two NRSs of 0 (no pain at all and not unpleasant at all, respectively) to 10 (worst pain ever and most unpleasant ever, respectively).

Statistical Analysis

All data were analyzed using SPSS 21 (IBM Corporation, Armonk, NY, USA). Percentages or means and SDs were used to describe the characteristics of the sample. Bivariate correlations were used to measure associations between variables and to examine whether any sociodemographic variable was correlated with the outcome measurements. Because the correlation between pain intensity and unpleasantness at the vestibular pressure-pain threshold was higher than 0.60, these two variables were combined to create a single self-report rating score (ie, SPR). Then, two sequential multiple regression models were conducted with sexual function and satisfaction as the dependent variables and intercourse-related pain intensity, the MPQ sensory and affective subscale scores, vestibular pain index, pain intensity ratings during vestibular friction, and vestibular pain threshold as the independent variables. The level of significance was set at a P vale less than .05.

RESULTS

Sample Characteristics

The total sample was comprised of 98 women clinically diagnosed with PVD. From this pool, only the data of the 87

Table 1. Sociodemographic characteristics (N = 87)*

Variable	Total sample
Age (y)	26.67 ± 5.81
Education (y)	15.90 ± 2.30
Age at first intercourse (y)	17.51 ± 2.79
Religion	
Catholic	60 (69)
Protestant	2 (2)
Jewish	2 (2)
Other	5 (6)
None	18 (21)
Place of birth	
North America	74 (85)
North America	6 (7)
North America	3 (3)
Other	4 (5)
Relationship status	
No regular partner	13 (15)
Dating 1 partner	32 (37)
Living with partner	34 (39)
Married	8 (9)
Duration of partner relationship (mo)	29.86 ± 31.78
Annual income	
<$60,000	70 (80)
>$60,000	17 (20)

*Data are presented as number (percentage) or mean ± SD.

Table 2. Pain characteristics and sexual adjustment (N = 87)*

Variable	Total sample
Duration of vulvovaginal pain (y)	5.46 ± 4.73
Intercourse-related pain intensity (0–10)	7.40 ± 2.20
MPQ sensory subscale score	21.66 ± 7.76
MPQ affective subscale score	4.85 ± 3.49
Pain rating during cotton-swab test (0–10)	7.50 ± 2.04
Pain rating during vestibular friction (0–10)	5.99 ± 2.59
Pressure-pain threshold (g)	45.0 ± 119.74
Pain rating at pressure-pain threshold (0–10)	2.60 ± 2.04
Unpleasantness rating at pressure-pain threshold (0–10)	3.50 ± 2.41
Self-report rating (0–10)	3.10 ± 2.03
FSFI total	19.79 ± 6.09
FSFI desire	3.18 ± 1.24
FSFI arousal	3.96 ± 1.42
FSFI lubrication	3.78 ± 1.52
FSFI orgasm	3.63 ± 1.78
FSFI satisfaction	3.59 ± 1.39
FSFI pain	1.71 ± 1.32
GMSEX	23.17 ± 5.81

FSFI = Female Sexual Function Index; GMSEX = Global Measure of Sexual Satisfaction; MPQ = McGill-Melzack Pain Questionnaire.
*Data are presented as mean ± SD.

participants who engaged in sexual intercourse in the past 4 weeks were selected for analyses.[30] There were no significant differences in sociodemographic variables between women who engaged in sexual intercourse and those who stopped having intercourse. Detailed sociodemographic and clinical characteristics of the sample are presented in Table 1. Age and relationship duration were significantly correlated with the FSFI total score ($r = -0.31$, $P < .01$; and $r = -0.22$, $P < .05$, respectively). Only age was included as a covariate in subsequent analyses because its correlation with sexual function was higher than 0.30 and because age and relationship duration were significantly correlated ($r = 0.45$, $P < .01$).

Pain Characteristics

Participant pain characteristics are presented in Table 2.

Sexual Function and Satisfaction

As presented in Table 2, the FSFI total score suggested levels of sexual dysfunction in the clinical range (ie, clinical cutoff point <26.5). The FSFI total score, the FSFI subscale scores, and the GMSEX scores were similar to scores reported in previous studies of PVD.[31,32]

Zero-Order Correlations Among Variables

Simple correlations among measurements of sexual function, satisfaction, and pain are listed in Table 3.

Pain Ratings as Correlates of Sexual Function and Satisfaction

A sequential multiple regression analysis (Table 4) was conducted to determine the relative contribution of each pain variable to sexual function. Examination of the β weights for this model indicated that none of the pain variables contributed unique variance to the prediction of sexual function. A second sequential multiple regression model was built to examine the contribution of the pain variables to sexual satisfaction. As presented in Table 4, none of the independent variables was uniquely associated with sexual satisfaction in the regression analysis.

DISCUSSION

The aim of the present study was to examine the associations among self-reported and objective pain measurements, sexual function, and sexual satisfaction in a large, combined clinical and community sample of premenopausal women diagnosed with PVD. After controlling for age, the present study showed that intercourse-related pain intensity, pain during the cotton-swab test, pain during vestibular friction, vestibular pressure-pain threshold, and the MPQ sensory and affective subscale scores were not significantly associated with sexual function and satisfaction in women with PVD.

Using a wide range of pain measurements, results corroborated those of previous studies showing no correlation between intercourse-related pain and overall sexual function[8-11] and satisfaction[8,11] but contradicted the results of a cross-sectional

Table 3. Bivariate correlations between study variables (N = 87)

	1	2	3	4	5	6	7	8	9	10	11
1. Intercourse-related pain intensity	—	0.38†	0.33†	0.23*	0.23*	−0.07	0.10	0.00	0.06	−0.06	0.00
2. MPQ Sensory Subscale Score	—	—	0.56†	0.09	0.25*	−0.08	0.02	−0.06	−0.01	−0.00	0.06
3. MPQ Affective Subscale Score	—	—	—	0.10	0.14	0.07	0.13	0.03	0.09	−0.01	−0.05
4. Pain rating during cotton-swab test (0–10)	—	—	—	—	0.40†	−0.29*	0.06	−0.03	0.02	−0.06	−0.16
5. Pain rating during vestibular friction (0–10)	—	—	—	—	—	−0.20	0.18	0.21	0.22	0.10	−0.19
6. Pressure-pain threshold (g)	—	—	—	—	—	—	0.19	0.15	0.18	0.08	0.07
7. Pain rating at pressure-pain threshold (0–10)	—	—	—	—	—	—	—	0.64†	0.89†	0.07	−0.22
8. Unpleasantness rating at pressure-pain threshold (0–10)	—	—	—	—	—	—	—	—	0.91†	0.16	−0.06
9. Self-report rating (0–10)	—	—	—	—	—	—	—	—	—	0.12	−0.13
10. FSFI total	—	—	—	—	—	—	—	—	—	—	0.54†
11. GMSEX	—	—	—	—	—	—	—	—	—	—	—

*$P < .05$; †$P < .01$.
FSFI = Female Sexual Function Index; GMSEX = Global Measure of Sexual Satisfaction; MPQ = McGill Pain Questionnaire.

study of women with PVD, which found that higher intercourse-related pain intensity was related to lower levels of sexual function and satisfaction.[7] Furthermore, in contrast with previous PVD research associating higher levels of pain severity with lower levels of sexual desire and lubrication,[8] the present study showed no significant correlations between intercourse-related pain and the FSFI subscale scores, except for the FSFI pain subscale. In line with the findings of two small studies,[7,15] the present study showed no association between the objective pain measurements (ie, pain during the cotton-swab test, pain during vestibular friction, vestibular pressure-pain threshold) and sexual function and satisfaction of women with PVD. Further, after combining pain and unpleasantness ratings—obtained at the vestibular pressure-pain threshold—into a SPR score, no association was found between the SPR and sexual function and satisfaction.

Taken together, the present findings suggest that in women with PVD, self-report and objective pain, on the one hand, and sexual function and satisfaction, on the other, are two distinct phenomena. There is an intuitive appeal to the notion that pain severity would be the primary determinant of sexual impairment in women with PVD. In accordance with this idea, health care providers have generally focused on the pain or the sexual dysfunction, assuming that treating one will alleviate the other. Indeed, incorporating the sexual history as part of the overall patient history is still not common practice for many physicians, including gynecologists, who often report being inadequately trained to discuss sexual health issues with their patients.[33] In contrast, psychologists and sex therapists often avoid talking about chronic pain and focus on the sexual dysfunctions in women with PVD. However, the present findings suggest that pain and sexual function and satisfaction contribute to the condition independently. Importantly, the results of the present study could explain why decreasing PVD-related pain does not necessarily lead to a restoration of sexual function, as shown in a randomized trial.[12] In addition, the present results suggest that other factors than pain severity and pain affect might be

Table 4. Results of sequential multiple regression analyses for pain ratings predicting sexual function and satisfaction (N = 87)

	FSFI			GMSEX		
	B	SE B	β	B	SE B	β
Step 1						
Age	−0.32	0.12	−0.31	−0.14	0.14	−0.14
Step 2						
Age	−0.28	0.13	−0.27*	−0.20	0.16	−0.20
Intercourse-related pain intensity	−0.16	0.38	−0.06	0.09	0.46	0.03
MPQ sensory subscale score	0.02	0.12	0.02	0.13	0.15	0.17
MPQ affective subscale score	0.06	0.27	0.03	−0.21	0.32	−0.12
Pain rating during cotton swab test	−0.08	0.42	−0.02	−0.19	0.51	−0.07
Pain rating during vestibular friction	0.13	0.34	0.05	−0.51	0.41	−0.24
Vestibular pressure-pain threshold	0.00	0.00	0.04	0.00	0.00	−0.00

*$P < .05$.
FSFI = Female Sexual Function Index; GMSEX = Global Measure of Sexual Satisfaction; MPQ = McGill Pain Questionnaire; SE = standard error.

important in determining the degree of sexual dysfunction experienced by patients with PVD. Indeed, previous research in PVD has associated greater anxiety and greater pain avoidance with poorer sexual function.[34] In addition, lower levels of pain self-efficacy, or the belief in one's capacity to meet the challenges of managing pain, have been related to worse sexual function.[21] Further, worse self-image cognitions about vaginal penetration and genital self-image have been found to contribute to poorer sexual functioning in women with PVD.[35] Because pain during intercourse is not limited to the woman's experience but occurs in a relational context, it is not surprising that interpersonal factors have been shown to contribute to sexual function and satisfaction in women with PVD.[9,36] Recent daily diary research has associated greater facilitative partner responses (eg, affection and encouragement of adaptive coping) with better sexual functioning[37] and greater sexual satisfaction.[32] Conversely, greater negative partner responses (eg, hostility) and solicitous partner responses (eg, sympathy) have been associated with lower sexual functioning[37] and satisfaction.[32] In addition, lower sexual communication and insecure romantic attachments have been associated with women's lower sexual function[38,39] and satisfaction.[39] In women with PVD, greater sexual intimacy has been associated with increased sexual function and satisfaction, and greater relationship intimacy has been associated with an increased sexual function.[9]

The present study expanded on previous research investigating the association between pain and sexual function and satisfaction in women with PVD by using a large, combined clinical and community sample, measuring the sensory and affective components of pain, and including self-report and objective measurements of pain. Further, this study not only focused on sexual function but also included a measurement of sexual satisfaction, because the two constructs have been shown to be distinct from each other.[40] In addition to the strengths of the present study, there are limitations that must be considered, such as the focus on premenopausal women with PVD, the lack of control regarding variations in the menstrual cycle[41] and in the use of hormonal contraceptives,[42] and the lack of information on the non-intercourse—related sexual behavior of women with PVD.

Despite the limitations, the results of this study have significant implications for future research and clinical practice. First, the lack of an association between pain and sexual function and satisfaction in women with PVD suggests that these are two independent, distinct clusters of symptoms, and that pain intensity is unrelated to whether women engage in sexual activity or not or find it enjoyable or not. Second, results underline the importance of including measurements of the two variables in future clinical trials. Third, because the present study showed that women with PVD can experience significant sexual impairment despite a low pain rating, future PVD research should avoid using eligibility criteria based on a cutoff of pain intensity ratings during sexual intercourse or the cotton-swab test. Fourth, the present findings suggest that other factors than pain intensity and pain affect might be more important in determining the degree of sexual dysfunction experienced by patients with PVD, indicating that the predictors of pain might need to be investigated independently from the predictors of sexual function and satisfaction in future PVD research. In clinical practice, many physicians still tend to focus on what seems to be the root of the problem, namely chronic pain, whereas many psychologists and sex and couple therapists feel comfortable addressing the sexual and psychosocial difficulties related to PVD but avoid addressing the pain component. However, the present findings suggest that focusing on the pain or the sexual dysfunction does not provide a good assessment of the burden of PVD and might be a less optimal goal for PVD treatment. Indeed, the present findings add to the growing literature on the biopsychosocial nature of PVD and underscore the importance of a patient-focused multidisciplinary treatment approach that targets pain, sexual function, and intra- and interpersonal factors associated with PVD to ensure the best outcomes.

CONCLUSION

The present findings suggest that in women with PVD, self-report and objective pain ratings are not associated with sexual function and satisfaction. The results support the integration of measurements of pain and measurements of sexual function and satisfaction in future PVD research and clinical practice.

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