American Journal of Epidemiology

Vol. 161, No. 9
Printed in U.S.A.
DOI: 10.1093/aje/kwi108

Adult-Onset Vulvodynia in Relation to Childhood Violence Victimization

Bernard L. Harlow[1] and Elizabeth Gunther Stewart[2]

[1] Obstetrics and Gynecology Epidemiology Center, Brigham and Women's Hospital, Harvard Medical School, Boston, MA.
[2] Harvard Vanguard Medical Associates, Department of Obstetrics and Gynecology, Harvard Medical School, Boston, MA.

Received for publication July 13, 2004; accepted for publication December 21, 2004.

Researchers have failed to find a consistent association between childhood victimization and vulvodynia, a debilitating, unexplained vulvar pain condition. However, selection bias associated with case ascertainment, and differential reporting bias between clinic-based cases and controls, may explain in part the inconsistent findings. In 2000–2003, the authors identified 125 women experiencing symptoms of vulvar pain consistent with vulvodynia and 125 age- and community-matched controls from the Boston, Massachusetts-area general population. Telephone-administered questionnaires were used to obtain medical, psychiatric, and reproductive histories. Self-administered surveys assessed childhood exposure (age <12 years) to physical and sexual abuse and to poor family support. After author adjustment for socioeconomic position, women with vulvar pain versus controls were 2.6 times more likely to report never/rarely receiving childhood family support, such as comfort, encouragement, and love (95% confidence interval (CI): 1.3, 5.1). Adult-onset vulvodynia was strongly associated with abuse as a child more than a few times physically (odds ratio (OR) = 4.1, 95% CI: 1.7, 10.0) or sexually (OR = 6.5, 95% CI: 1.2, 35.1). When abused women were compared with those with no history of abuse, the association was largely confined to those harmed by a primary family member (OR = 3.6, 95% CI: 1.6, 8.0 for physical abuse; OR = 4.4, 95% CI: 0.9, 22.9 for sexual abuse). Additional population-based studies of clinically confirmed cases of vulvodynia are needed to replicate this association.

case-control studies; child abuse; dyspareunia; genitalia, female; pain; vulva; vulvar diseases; women

We recently showed that the prevalence of vulvodynia, a chronic vulvar pain disorder that occurs in the absence of objective abnormalities such as infection or dermatoses, may be as high as 7 percent among women in the general population (1, 2). In addition, these cross-sectional associations suggest that nearly 50 percent of women who develop this disorder during the height of their reproductive years report pain and difficulty with their first tampon use (1, 2). Thus, pain with first tampon use may be a marker for other exposures occurring during childhood (before first tampon use) that may be involved in the etiology of vulvodynia.

Recent studies have shown associations of early childhood victimization with fibromyalgia (3, 4), chronic pelvic pain syndrome (5, 6), and chronic refractory low back pain (7). A community-based study found that women with high tender-point counts on various parts of the body were substantially more likely to have a history of childhood victimization (8). Although several earlier clinical studies alluded to a possible association between childhood sexual abuse and vulvodynia (9–11), two recent case-control studies failed to find an association (12, 13). However, these studies restricted cases to those women who sought treatment for their vulvar disorders and controls from either dermatology or general gynecology clinics. Recent population-based studies suggest that approximately 40 percent of women who suffer from chronic unexplained vulvar dysesthesia fail to seek treatment (1, 2), and women victimized as children use health care services more than women with no such history (14–16). Therefore, the lack of an association in these earlier studies could be due in part to different patterns of treatment-seeking behavior among clinic-based cases and controls. Using cases identified from the general population and age- and community-matched controls, we sought to determine whether fear of or actual childhood victimization, including sexual and physical abuse, influenced the risk of vulvodynia.

Correspondence to Dr. Bernard L. Harlow, Obstetrics and Gynecology Epidemiology Center, Brigham and Women's Hospital, 221 Longwood Avenue, Boston, MA 02115 (e-mail: bharlow@rics.bwh.harvard.edu).

MATERIALS AND METHODS

The study methods and approach used to contact and interview participants were reviewed and approved by the Human Subjects Research Committee at Brigham and Women's Hospital. Written informed consent was obtained from all cases and controls.

Target population

Using Massachusetts Town Books (annual census publications that list residents by name, age, and address), we randomly selected 450 women aged 18–64 years each month for 36 months from three ethnically diverse Boston neighborhoods (defined geographically by zip code) and three west suburban communities. The monthly sample was weighted to the age and community distribution of all communities combined based on US Census data and included only those women whose telephone numbers could be verified.

A one-page, double-sided, optically scannable questionnaire was designed to assess whether women in the general population had ever experienced chronic vulvar pain symptoms for 3 months or longer, including itching, burning, knifelike sharp pain, or pain on contact during intercourse, tampon insertion, or a pelvic examination. This questionnaire was mailed to the 16,200 subjects sampled; 1,494 questionnaires were returned as undeliverable with no forwarding address. After three mailings and a telephone follow-up for nonresponders, 2,108 subjects could not be confirmed as residing at the household to which the questionnaire was mailed, and 551 subjects could not complete the questionnaire because of a language barrier. Of the remaining 12,047 subjects, 8,125 (67.4 percent) completed the screener questionnaire (figure 1). Our response was somewhat lower for inner-city neighborhoods (64.8 percent) compared with the west suburban communities (68.5 percent), but the mean age of responders and nonresponders was similar at 42 and 43 years, respectively.

Of the 8,125 women screened, 463 reported chronic vulvar pain symptoms other than chronic itching (a symptom more likely to be related to recurrent *Candida* infections or a vulvar dermatosis), and these women were eligible for further screening as potential cases. There were 1,175 women with chronic itching and/or other non-vulvodynia-related symptoms who were excluded from further consideration and 6,487 women with no history of vulvar pain symptoms who became part of the pool of eligible controls.

Selection of cases and controls

Women reporting vulvodynia-related symptoms (n = 463, figure 1) were asked to participate in a telephone interview to rule out other vulvar conditions often misclassified as vulvodynia, including sexually transmitted diseases, yeast/bacterial infections, vulvar skin problems, misclassified pelvic disorders, estrogen-related dyspareunia, and inflammatory vaginitis. Questions asked about the effectiveness of vaginal creams in alleviating symptoms, nocturnal awakenings, use of self-treatments, specific pain location, consistency of pain since the start of sexual intercourse, use of and effectiveness of lubricants, and use of hormone replacement therapy. As shown in figure 1, a total of 330 women (71.3 percent) agreed to complete the telephone assessment. A similar proportion of telephone interview participants compared with nonparticipants reported pain on contact (73 percent vs. 78 percent), knifelike pain (34 percent vs. 37 percent), and vulvar burning (23 percent vs. 21 percent). On the basis of the telephone and initial self-administered interviews, our clinical expert (E. G. S.) selected as eligible cases women with vulvodynia-related symptoms likely to meet the International Society for the Study of Vulvovaginal Disorders criteria for vulvodynia (n = 200). Women who had symptoms consistent with conditions other than vulvodynia (i.e., infection, dermatosis) were excluded (n = 130). Of the 200 eligible cases, 152 (76.0 percent) agreed to participate in interviews that assessed medical, psychiatric, and sexual histories and childhood victimization.

All cases were offered a free clinical examination to confirm their diagnosis and a recommended course of therapy. Seventy cases agreed, and, for 56 (80 percent), their diagnosis was clinically confirmed as meeting the strict clinical definition of vulvodynia. Fourteen women misclassified with no disorder (n = 3), lichen sclerosis (n = 2), vaginal infections (n = 2), pelvic pain disorder (n = 6), and irritable bowel syndrome (n = 1) were excluded. For 82 women classified as cases, vulvodynia was not clinically confirmed. The childhood victimization assessment was completed by 52 of the 56 cases whose diagnosis was clinically confirmed (93 percent) and 73 of the 82 cases whose diagnosis was not (89 percent). Thus, 125 cases were included in this analysis. Participating cases were slightly younger (mean age = 38 years) than nonparticipating cases (mean age = 40 years) and were less likely to be non-Caucasian (15 percent vs. 29 percent, respectively).

Table 1 illustrates that cases with clinically and non-clinically confirmed vulvodynia were similar in reporting pain on contact and knifelike sharp pain for 3 months or longer. Age at first onset of vulvar symptoms and frequency of reported symptoms were similar as well. Only burning as a vulvar symptom varied between cases with clinically confirmed (43.1 percent) and non-clinically confirmed (23.3 percent) vulvodynia.

Although reported vulvar symptoms in both of these types of cases were similar, we chose to present the associations by first including all 125 cases and then separately including only the subset of 52 cases of vulvodynia confirmed after clinical examination. We refer to all cases throughout the text as those with vulvodynia, recognizing that a certain proportion who were not clinically examined could be misclassified as having some other chronic vulvar or genital tract condition. We explore the ramification of this potential misclassification in the Discussion section.

For each case, we randomly selected a control within 5 years of age of the case from the same community. All controls self-reported no lifetime history of chronic vulvar pain. We approached 235 women from the pool of eligible controls to obtain 125 participants for this study. As with

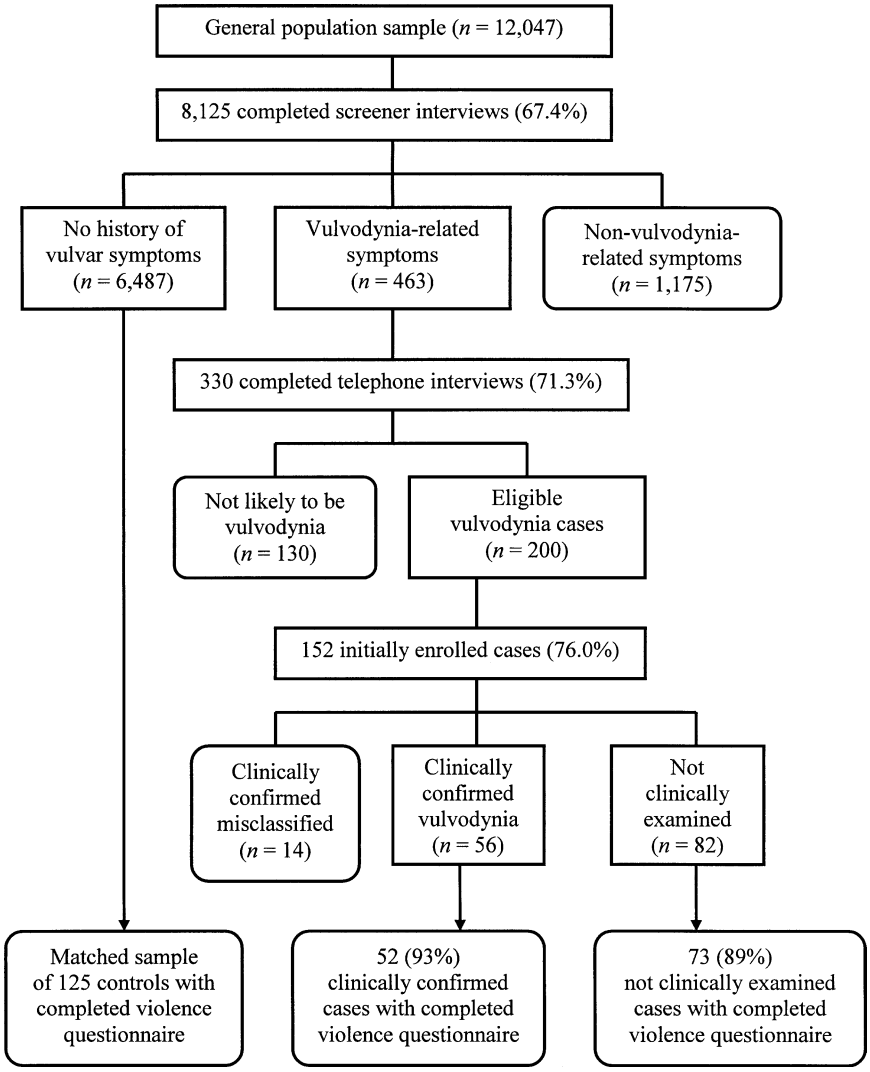

FIGURE 1. Flow chart of general population screening used to identify cases and controls from the Boston, Massachusetts, metropolitan area for a study of adult-onset vulvodynia in relation to childhood violence victimization, 2000–2003.

cases, participating controls were somewhat younger than nonparticipating controls (age 38 years vs. age 41 years, respectively), but a similar proportion of participating and nonparticipating controls were non-Caucasian (16 percent vs. 17 percent, respectively).

Violence victimization assessment

We used the Survey of Interpersonal Relationships, a self-administered, optically scannable, 73-item questionnaire developed by researchers from Brown University (Providence, Rhode Island), the Harvard School of Public Health, and Brigham and Women's Hospital (17). This survey was derived from the Conflict Tactics Scale and the pregnancy Abuse Assessment Screen (18, 19). These instruments are widely recognized as representing a broad categorization of victimization, particularly because they assess witnessed as well as actual acts of violence.

Briefly, during each time period (as a child younger than age 12 years, as a teenager between ages 12 and 18 years, or as an adult older than age 18 years), and for each abuse-specific question, women selected the category that best described the frequency of their exposure: never, a few times or less, more than a few times. Physical abuse included the experience or fear of being 1) pushed, grabbed, or shoved; 2) injured by objects thrown; 3) kicked, bit, or punched; 4) hit with a hand or fist; 5) choked or burned; 6) physically attacked in some other way; or 7) a witness to violence toward another household member. We considered women to be "severely" abused if they were *ever* choked or burned or physically attacked or, *more than a few times*, were hit, pushed, shoved, kicked, or hit by objects or a hand that hurt

TABLE 1. Comparison of vulvar symptoms between clinically confirmed and non-clinically confirmed population-based cases of vulvodynia, Boston, Massachusetts, metropolitan area, 2000–2003

	Cases of vulvodynia (%)	
	Clinically confirmed ($n = 52$)	Non-clinically confirmed ($n = 73$)
Reported experiencing in the genital area for 3 months or longer		
Pain on contact during intercourse or a pelvic examination	86.5	82.2
Periodic knifelike or sharp pain	36.5	33.3
Burning*	43.1	23.3
Age at first diagnosis (years)		
<20	30.8	23.3
20–24	21.2	28.8
25–30	23.1	26.0
>30	25.0	21.9
Experienced pain that was off-and-on vs. continuous	53.8	49.3
Experienced >30 episodes of pain since the first episode	44.2	37.0
Had always experienced pain during intercourse	26.9	27.4
Tried to use a lubricant to alleviate the pain and it never helped	17.3	26.0
Experienced pain and difficulty with first tampon use	61.4	54.8

* Difference significant at $p < 0.05$.

the body. Sexual abuse was defined as threatened, attempted, or actual infliction of sexual harm. We categorized the source of physical and sexual abuse as primary or secondary family members, strangers, schoolmates, neighbors, or other acquaintances. We also inquired about emotional and social support at home while growing up and the extent to which respondents felt in danger at home, at school, or in their neighborhood during childhood. We further collected and adjusted for markers of socioeconomic position as a child based on household income, job descriptions of the primary wage earner, and ownership of a home. A detailed telephone-administered medical history and psychiatric structured clinical assessment was conducted on all cases and controls.

Statistical analyses

We restricted the analyses to violence victimization during childhood (younger than age 12 years) to ensure that the exposure was before the age at first onset of vulvar symptoms. Conditional logistic regression models were used to estimate the odds of early-life violence victimization for those with and without subsequent vulvar dysesthesia. Race, religion, and education were included as covariates in all logistic regression models. We further adjusted for surrogate variables of socioeconomic position during the subjects' childhood years.

RESULTS

Cases and controls did not vary by age or educational attainment. However, cases were somewhat more likely to be Hispanic and less likely to be African American (table 2). We think that this difference by race is largely due to selection bias since a greater proportion of nonparticipating cases compared with participating cases was non-Caucasian, while a similar proportion of participating and nonparticipating controls was non-Caucasian. We further address this issue in the Discussion section below. Cases were more likely than controls to have lived in households during childhood whose primary wage earner was employed in a more skilled position. However, as children, cases experienced more poverty than controls.

Women who never or only rarely received family support as children were two to three times more likely to report vulvodynia symptoms compared with women who sometimes or more often received support, even after adjustment for socioeconomic position (table 3). Women who reported feeling danger in their home, neighborhood, or school as children were also two to three times more likely to experience vulvodynia symptoms compared with women who did not report such fear. These findings remained largely unchanged when we restricted the analyses to the subgroup of clinically confirmed cases of vulvodynia (confidence intervals were larger because of smaller sample sizes, but a similar trend was observed). When childhood endangerment was separated by its components, danger at home and at school accounted for the majority of the association.

As shown in table 4, we restricted the reference group to women who had no history of either physical or sexual abuse as children. Women who reported severe physical abuse in childhood were four times more likely to report vulvodynia symptoms than women with no physical or

TABLE 2. Demographic characteristics of women with and without vulvodynia, Boston, Massachusetts, metropolitan area, 2000–2003

	Cases		Controls	
	No.	%	No.	%
Age at interview (years)				
<30	41	32.8	39	31.2
30–39	28	22.4	28	22.4
40–49	31	24.8	35	28.0
≥50	25	20.0	23	18.4
Reference age (years)*				
<20	33	26.4	33	26.4
20–24	32	25.6	33	26.4
25–30	31	24.8	32	25.6
>30	29	23.2	27	21.6
Race/ethnicity†				
White, not of Hispanic origin	110	88.0	104	83.2
Hispanic	10	8.0	4	3.2
African American	3	2.4	15	12.0
Other	2	1.6	2	1.6
Religion				
Catholic	64	51.2	73	58.4
Jewish	18	14.4	11	8.8
Protestant	24	19.2	21	16.8
Other	19	15.2	20	16.0
Education				
Less than college	28	22.4	35	28.0
College graduate	52	41.6	42	33.6
Graduate school	45	36.6	48	38.4
Work situation of the primary wage earner when participant was a child				
Owned a business or worked in a supervisory setting	77	61.6	68	54.4
Worked in a setting with no supervision of others	32	25.6	36	28.8
Was unemployed	10	8.0	16	12.8
Unknown	6	4.8	5	4.0
Poverty in childhood‡				
No	99	79.2	110	88.0
Yes	26	20.8	15	12.0
Family home ownership in childhood				
No	26	20.8	28	22.4
Yes	99	79.2	97	77.6

* Age at first onset of vulvar pain symptoms for cases and matched reference age for controls to ensure comparable exposure assessments.

† Difference significant at $p < 0.05$.

‡ Defined as on at least two occasions, the family did not have enough money to pay for food, had to borrow money for medical expenses, did not have enough money to meet expenses, or received public assistance.

sexual abuse history, after adjustment for demographic characteristics and childhood socioeconomic position. Virtually all of the association with physical abuse was confined to those women who lived in fear of physical abuse as well. We further assessed whether the association of fear or actual physical harm with vulvar dysesthesia varied by source of the victimization. Women who reported being afraid of, or who actually were physically harmed by, a primary family member (mother, father, sibling) were three to four times more likely to report vulvodynia symptoms than those who had no physical or sexual abuse history. However, cases and controls had the same odds of reporting fear of, or actual physical abuse by, a distant or nonfamily member. Again, the findings illustrated in this table remained consistent when we assessed the subgroup of cases whose vulvodynia was clinically confirmed. Women who reported severe sexual abuse in childhood were six times more likely to report vulvodynia symptoms than women who reported no physical or sexual childhood abuse. However, the confidence intervals were wide because of a low prevalence of this exposure. Nevertheless, as with physical abuse, the greatest association was observed for those women sexually harmed by their mother, father, or sibling.

We sought to determine the individual and joint effect of childhood physical or sexual abuse, endangerment, and lack of family support on the risk of vulvodynia. For women with no history of severe physical or sexual abuse, a lack of family support and feeling endangered in childhood were only modestly associated with vulvodynia (table 5). For women who received family support and/or had no childhood feeling of endangerment, severe physical or sexual abuse was still associated with a nearly threefold increased risk of vulvodynia. However, the joint effect of severe abuse, childhood endangerment, and lack of family support was associated with a 14-fold odds of vulvodynia.

DISCUSSION

Without a clinical examination, we could not truly determine whether a patient met the International Society for the Study of Vulvovaginal Disorders criteria for vulvodynia. However, as illustrated in table 1, virtually all reported characteristics of the vulvar pain symptoms were similar for cases of vulvodynia clinically confirmed and not clinically assessed, and our associations among all cases and controls were quite similar to those within the subset of clinically confirmed cases and controls. Furthermore, it has been well documented that when study subjects are misclassified regarding the outcome (i.e., vulvodynia) and the misclassification does not affect assessment of the exposure (i.e., childhood victimization), the observed association is usually attenuated toward the null (20, 21). Thus, the associations observed in our analyses in which all cases were included likely *underestimated* the true effect.

We recognize that our non-Caucasian cases underrepresent those with vulvodynia in the general population. Our earlier study showed that the cumulative incidence of vulvodynia symptoms was similar among African-American and Caucasian women, whereas Hispanic women

TABLE 3. Association between family support as a child; experiencing danger at home, in the neighborhood, or at school as a child; and subsequent risk of vulvodynia, Boston, Massachusetts, metropolitan area, 2000–2003

	Cases (%) ($n = 125$)	Controls (%) ($n = 125$)	All case-control pairs		Validated cases with matched controls	
			Odds ratio*	95% confidence interval	Odds ratio*,†	95% confidence interval
Frequency of family support as a child‡						
Often or very often	36.8	50.4	1.0		1.0	
Sometimes	21.6	22.4	1.4	0.7, 3.0	1.8	0.6, 5.8
Never or rarely	41.6	27.2	2.6	1.3, 5.1	3.3	0.9, 12.3
Felt danger at home, in my neighborhood, or at school						
Never	63.2	80.0	1.0		1.0	
A few times or more	36.8	20.0	2.3	1.2, 4.5	3.2	1.1, 8.3
Felt danger at home						
Never	72.8	84.8	1.0		1.0	
A few times or more	27.2	15.2	2.1§	1.0, 4.6	2.5§	0.5, 12.9
Felt danger in my neighborhood						
Never	84.0	88.0	1.0		1.0	
A few times or more	16.0	12.0	0.6§	0.2, 1.7	0.7§	0.1, 3.5
Felt danger at my school						
Never	89.6	98.4	1.0		1.0	
A few times or more	10.4	1.6	5.0§	1.0, 25.0	0.8§	0.1, 7.2

* Adjusted for race/ethnicity, religion, education, parental work situation in childhood, poverty in childhood, and family home ownership in childhood.

† Restricted to cases clinically confirmed as having vulvodynia and their matched controls (52 pairs).

‡ Defined as having family members to talk with about problems, provide comfort when hurt or frightened, offer encouragement, and provide love and safety as well as no fear of being a witness to abuse.

§ Adjusted for reference age, race/ethnicity, religion, education, parental work situation in childhood, poverty in childhood, family home ownership in childhood, and each danger item simultaneously.

were at greater risk of this disorder (2). If minority status is associated with greater risk of childhood victimization, our sample of cases (which underrepresented the true proportion of minority women with vulvodynia) compared with controls likely *underestimated* the true association between childhood victimization and risk of vulvodynia.

We were also concerned about possible reporting bias for women with current mood disorder as a consequence of their vulvar pain. However, there were only eight cases and one control with current mood disorder; when we excluded these matched pairs, our findings remained unchanged.

It has been well documented that vulvodynia is associated with profound psychological morbidity, including loss of sexual satisfaction, depressed mood, and anxiety (22–30). However, two recent studies assessed the effect of childhood victimization on the risk of developing chronic vulvar dysesthesia and found little or no association. Edwards et al. (12) surveyed 89 women with vulvodynia and 65 women with chronic vulvar disease due to objective physical findings being seen in a vulvovaginal specialty clinic. They compared these women with 166 women being seen in a general dermatology clinic for nongenital conditions and found a similar rate of abuse across all three groups. Likewise, in a recent study conducted at the University of Michigan, patients referred to the Center for Vulvar Disease with a confirmed diagnosis of vulvar dysesthesia were compared with women being seen in the general gynecology clinic (13). Six questions assessed history of sexual abuse by a relative, sexual assault, physical abuse, and emotional injury secondary to these events. No differences were observed with respect to sexual or physical abuse. Why then did we find such a strong association between childhood victimization and vulvar dysesthesia in our study?

We cannot rule out chance or differences in the instruments used to assess violence victimization as possible explanations for the inconsistent findings. However, the differences in the source of both cases and controls between our study and others may explain some of these discrepancies. Our study identified vulvodynia cases from the general population, and, of our 125 cases evaluated in this analysis, 29 (23 percent) never sought treatment for their condition. Compared with cases who had sought treatment,

TABLE 4. Association between fear of and actual childhood physical and sexual abuse and subsequent risk of vulvodynia, Boston, Massachusetts, metropolitan area, 2000–2003

	Cases (%) ($n = 125$)	Controls (%) ($n = 125$)	All case-control pairs		Validated cases with matched controls	
			Odds ratio*	95% confidence interval	Odds ratio*,†	95% confidence interval
Never physically or sexually harmed	24.8	37.6	1.0		1.0	
Physically harmed as a child‡						
Moderately abused§	43.2	48.0	1.3	0.7, 2.5	2.1	0.5, 9.4
Severely abused§	28.8	12.0	4.1	1.7, 10.0	5.6	0.9, 36.0
Fear of physical harm as a child‡						
Physically harmed but never lived in fear	27.2	40.0	1.0	0.5, 2.1	1.1	0.2, 5.7
Physically harmed and lived in fear	44.8	20.0	3.0	1.5, 6.3	3.8	0.8, 18.4
Source of physical harm or fear of harm as a child‡						
Physically harmed by a nonfamily member only	32.8	41.6	1.1	0.6, 2.2	1.7	0.4, 7.5
Physically harmed by a mother, father, or sibling	39.2	18.4	3.6	1.6, 8.0	5.3	0.9, 30.3
Sexually abused as a child¶						
Moderately abused#	10.4	8.8	1.5	0.6, 4.1	1.7	0.3, 9.9
Severely abused#	8.0	2.4	6.5	1.2, 35.1	2.0	0.1, 90.3
Fear of sexual abuse as a child¶						
Sexually abused but never lived in fear	7.2	4.8	2.4	0.6, 9.0	0.7	0.1, 9.8
Sexually abused and lived in fear	11.2	6.4	2.3	0.8, 6.5	2.7	0.4, 20.6
Source of sexual abuse as a child¶						
Sexually abused by a nonfamily member only	10.4	9.6	1.8	0.7, 4.9	1.5	0.3, 8.6
Sexually abused by a mother, father, or sibling	8.0	1.6	4.4	0.9, 22.9	—**	

* Adjusted for race/ethnicity, religion, education, parental work situation in childhood, poverty in childhood, and family home ownership in childhood.

† Restricted to women clinically confirmed as having vulvodynia (52 matched pairs of cases and controls).

‡ Percentages do not add to 100 because the reference group excludes four (3.2%) cases and three (2.4%) controls who reported a history of sexual abuse but no physical abuse.

§ Moderately abused was defined as follows: a few times but more than once was, or lived in fear of being, 1) pushed, grabbed, or shoved; 2) hit by objects that were thrown; 3) kicked, bit, or punched; or 4) hit with a hand or fist that hurt my body. Severely abused was defined as follows: a few times but more than once was, or lived in fear of being, choked or burned or physically attacked; or, more than a few times was, or lived in fear of being, 1) pushed, grabbed, or shoved; 2) hit by objects that were thrown; 3) kicked, bit, or punched; or 4) hit with a hand or fist that hurt my body.

¶ Percentages do not add to 100 because the reference group excludes 71 (56.8%) cases and 64 (51.2%) controls who reported a history of physical harm but no sexual abuse. The reference group also includes six women reporting no sexual abuse but a fear of sexual abuse.

Moderate sexual abuse refers to sexual assault a few times or less as a child. Severe sexual abuse refers to sexual assault more than a few times as a child.

** Because of missing values, an odds ratio could not be determined.

TABLE 5. Joint effect of severe physical and sexual abuse, lack of family support, and feelings of endangerment as a child, and the association with and impact on cumulative incidence of vulvodynia, Boston, Massachusetts, metropolitan area, 2000–2003

Childhood victimization*		Cases (%) ($n = 125$)	Controls (%) ($n = 125$)	All case-control pairs		Validated cases with matched controls	
Physical or sexual abuse	Family support and feelings of danger			Odds ratio†	95% confidence interval	Odds ratio†,‡	95% confidence interval
1. No severe abuse	Had support and/or felt no danger	61.6	81.6	1.0		1.0	
2. No severe abuse	Never or rarely had support, felt in danger	8.0	6.4	1.6	0.5, 4.7	1.5	0.2, 9.3
3. Any severe abuse	Had support and/or felt no danger	15.2	9.6	2.8	1.1, 6.9	2.2	0.5, 10.7
4. Any severe abuse	Never or rarely had support, felt in danger	15.2	2.4	14.0	2.6, 76.1	13.2	0.8, 217.8
Combined effect of exposure categories 2, 3, and 4		38.4	18.4	3.1	1.6, 6.1	2.5	0.7, 9.3

* Severe physical and sexual abuse are defined in table 4; never or rarely receiving family support, and feeling danger at home, in the neighborhood, or at school are defined in table 3.

† Adjusted for race/ethnicity, religion, education, parental work situation in childhood, poverty in childhood, and family home ownership in childhood.

‡ Restricted to women clinically confirmed as having vulvodynia (52 matched pairs of cases and controls).

cases who never sought treatment were *more* likely to report never or rarely receiving family support as a child (48 percent vs. 40 percent), physical harm by a primary family member (52 percent vs. 35 percent), and sexual harm by a primary family member (17 percent vs. 5 percent). With respect to controls, Finestone et al. (16) observed that women sexually abused in childhood had more than three times the number of visits to general practitioners as other women with psychiatric disorders not related to childhood abuse. Arnow et al. (15) reported that, within a population of childhood-abused women, those experiencing more severe childhood abuse were three times more likely to utilize emergency room services and twice as likely to utilize nonpsychiatric outpatient clinics in adulthood compared with women experiencing less severe childhood abuse. Thus, the *underreporting* of childhood victimization by clinic-based cases and the *overreporting* by clinic-based controls may explain in part the null associations reported by Edwards and Dalton (12, 13).

We assessed to what extent childhood victimization may be a marker for difficulty with first tampon use and found that a lack of family support, feeling in danger as a child, and experiencing childhood sexual abuse were not associated with pain and difficulty with first tampon use (data not shown). However, we did observe that childhood physical abuse was strongly associated with pain and difficulty with first tampon use. When we adjusted for pain with first tampon use in assessing the association between childhood physical abuse and risk of vulvar dysesthesia, our relative risk estimates remained unchanged. We also found that the association of childhood physical abuse with vulvodynia was present in both subsets of women who did or did not experience pain with first tampon use. Therefore, childhood physical abuse appears to influence the risk of vulvodynia through a pathway independent of pain and difficulty with first tampon use.

Is there evidence to suggest that childhood victimization can influence the development of pain syndromes in adults? For years, this association has been assumed to be true, but most evidence is based on retrospective self-reporting of childhood victimization. The accuracy of this reporting may be influenced by current psychological morbidity at the time of assessment, and adult pain syndromes reported by women victimized as children may be somatic manifestations of current psychopathology. However, in a prospective study by Raphael et al. (31), men and women physically abused as children were at significantly greater risk of developing an unexplained pain syndrome (i.e., pain symptoms not attributed to medication, drugs, alcohol, physical illness, or injury), and this association was confined to subjects with no history of major depression. In contrast, no association was observed for developing an explained pain syndrome irrespective of intervening major depression. The authors concluded that medically unexplained pain is not necessarily psychogenic.

As with all studies that retrospectively assess childhood victimization, the reporting of this exposure is subject to recall bias and misclassification. We were unable to validate actual abuse in terms of occurrence, type, severity, or life stage. It is also plausible that our measurement of violence victimization may be broader than other scales of abuse. Differential recall between women with and without vulvodynia cannot be ruled out, and, if women with vulvar pain are more likely than other women to recall early exposures to actual or fear of abuse, we would observe a spuriously large relative risk for the association between childhood abuse and vulvodynia.

If the association between childhood victimization and vulvodynia is true, it is possible that childhood victimization may be a marker for other life events during years of sexual activity. For example, earlier studies have suggested that victims of childhood sexual abuse are younger at first

intercourse, have greater numbers of partners, and have a greater risk of sexually transmitted diseases (15, 16). There is also the possibility that psychological trauma associated with childhood victimization may have a direct role in vulvar inflammatory response mechanisms. Gerber et al. (32) recently reported that, compared with controls, women with vulvar vestibulitis have a reduced capacity to produce interferon alpha, resulting in the inability to curtail the inflammatory response as a consequence of infection or other vulvar trauma. The stress associated with childhood victimization may directly increase production of proinflammatory cytokines. Likewise, psychological stress is also associated with a reduction in lymphocytes, natural killer cell activity, and levels of interferon gamma (33, 34). Thus, chronic stress as a consequence of childhood victimization may have a long-lasting effect on cellular-mediated immune response.

Before we can determine whether our observed association between childhood victimization and adult-onset vulvodynia is indeed causal, it should be replicated with similar victimization assessments in other population-based, rather than clinical-based, observational studies. Even if this association is true, the mechanism by which childhood abuse may influence the risk of adult-onset vulvodynia remains elusive. Nevertheless, it is becoming more apparent that, to understand the etiology of vulvodynia, more emphasis should be directed toward assessing early-life exposures for women at risk of this debilitating, chronic vulvar condition.

ACKNOWLEDGMENTS

The authors thank Drs. Barbara Reed, Libby Edwards, and Howard Glazer for providing an objective critique of an earlier draft of this manuscript and Nancy Mansbach for technical editing assistance.

REFERENCES

1. Harlow BL, Wise LA, Stewart EG. Prevalence and predictors of chronic genital discomfort. Am J Obstet Gynecol 2001; 185:545–50.
2. Harlow BL, Stewart EG. A population-based assessment of chronic unexplained vulvar pain: have we underestimated the prevalence of vulvodynia? J Am Med Womens Assoc 2003; 58:82–8.
3. Walker EA, Keegan D, Gardner G, et al. Psychosocial factors in fibromyalgia compared with rheumatoid arthritis: II. Sexual, physical, and emotional abuse and neglect. Psychosom Med 1997;59:572–7.
4. Boisset-Pioro MH, Esdaile JM, Fitzcharles MA. Sexual and physical abuse in women with fibromyalgia syndrome. Arthritis Rheum 1995;38:235–41.
5. Bodden-Heidrich R, Kuppers V, Beckmann MW, et al. Chronic pelvic pain syndrome (CPPS) and chronic vulvar pain syndrome (CVPS): evaluation of psychosomatic aspects. J Psychosom Obstet Gynaecol 1999;20:145–51.
6. Rapkin AJ, Kames LD, Darke LL, et al. History of physical and sexual abuse in women with chronic pelvic pain. Obstet Gynecol 1990;76:92–6.
7. Schofferman J, Anderson D, Hines R, et al. Childhood psychological trauma and chronic refractory low-back pain. Clin J Pain 1993;9:260–5.
8. McBeth J, Macfarlane GJ, Benjamin S, et al. The association between tender points, psychological distress, and adverse childhood experiences: a community-based study. Arthritis Rheum 1999;42:1397–404.
9. Goetsch MF. Vulvar vestibulitis: prevalence and historic features in a general gynecological practice population. Am J Obstet Gynecol 1991;164:1609–16.
10. Freidrich EG. Vulvar vestibulitis. J Reprod Med 1987;32: 110–14.
11. Jantos M, White G. The vestibulitis syndrome: medical and psychosexual assessment of a cohort of patients. J Reprod Med 1997;42:145–52.
12. Edwards L, Mason M, Phillips M, et al. Childhood sexual and physical abuse: incidence in patients with vulvodynia. J Reprod Med 1997;42:135–9.
13. Dalton VK, Haefner HK, Reed BD, et al. Victimization in patients with vulvar dysesthesia/vestibulodynia: is there an increased prevalence? J Reprod Med 2002;47:829–34.
14. Cunningham J, Pearce T, Pearce P. Childhood sexual abuse and medical complaints in adult women. J Interpers Violence 1994;3:131–44.
15. Arnow BA, Hart S, Hayward C, et al. Severity of child maltreatment, pain complaints and medical utilization among women. J Psychiatr Res 2000;34:413–21.
16. Finestone HM, Stenn P, Davies F, et al. Chronic pain and health care utilization in women with history of childhood sexual abuse. Child Abuse Negl 2000;24:547–56.
17. Wise L, Zierler S, Krieger N, et al. Adult onset of major depressive disorder in relation to childhood and adolescent violence victimization: a case-control study. Lancet 2001; 358:881–7.
18. Straus MA, Gelles RJ, Steinmetz SK. Behind closed doors: a survey of family violence in America. New York, NY: Doubleday, 1980.
19. McFarlane J, Parker B, Soeken K, et al. Assessing for abuse during pregnancy: severity and frequency of injuries and associated entry into prenatal care. JAMA 1992;267:3176–8.
20. Copeland KT, Checkoway H, McMichael AJ, et al. Bias due to misclassification in the estimation of relative risk. Am J Epidemiol 1977;105:488–95.
21. Rothman KJ, Greenland S, eds. Precision and validity in epidemiologic studies. In: Modern epidemiology. 2nd ed. Philadelphia, PA: Lippincott-Raven, 1998:127.
22. Gates EA, Galask RP. Psychological and sexual functioning in women with vulvar vestibulitis. J Psychosom Obstet Gynaecol 2001;22:221–8.
23. Green J, Christmas P, Goldmeier D, et al. A review of physical and psychological factors in vulvar vestibulitis syndrome. Int J STD AIDS 2001;12:705–9.
24. Lamont J, Randazzo J, Farad M, et al. Psychosexual and social profiles of women with vulvodynia. J Sex Marital Ther 2001; 27:551–5.
25. Sackett S, Gates E, Heckman-Stone C, et al. Psychosexual aspects of vulvar vestibulitis. J Reprod Med 2001;46:593–8.
26. Danielsson I, Sjoberg I, Wikman M. Vulvar vestibulitis: medical, psychosexual and psychosocial aspects, a case-control study. Acta Obstet Gynecol Scand 2000;79:872–8.
27. Reed BD, Haefner HK, Punch MR, et al. Psychosocial and sexual functioning in women with vulvodynia and chronic pelvic pain. A comparative evaluation. J Reprod Med 2000;45:624–32.
28. Bodden-Heidrich R, Kuppers V, Beckmann MW, et al. Psychosomatic aspects of vulvodynia. Comparison with the

chronic pelvic pain syndrome. J Reprod Med 1999;44:411–16.
29. Nunns D, Mandal D. Psychological and psychosexual aspects of vulvar vestibulitis. Genitourinary Med 1997;73:541–4.
30. Jantos M, White G. The vestibulitis syndrome. Medical and psychosexual assessment of a cohort of patients. J Reprod Med 1997;42:145–52.
31. Raphael KG, Widom CS, Lange G. Childhood victimization and pain in adulthood: a prospective investigation. Pain 2001;92:283–93.
32. Gerber S, Bongiovanni AM, Ledger WJ, et al. A deficiency in interferon-alpha production in women with vulvar vestibulitis. Am J Obstet Gynecol 2002;186:361–4.
33. Kawamura N, Kim Y, Asukai N. Suppression of cellular immunity in men with past history of posttraumatic stress disorder. Am J Psychiatry 2001;158:484–6.
34. Maes M, Christophe A, Bosmans E, et al. In humans, serum polyunsaturated fatty acid levels predict the response of proinflammatory cytokines to psychological stress. Biol Psychiatry 2000;47:910–20.