**Treatment of Female Sexual Pain Disorders: A Systematic Review**

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 **Abstract**

Sexual pain disorders affect women’s sexual and reproductive health and are poorly understood. Although many treatments have been evaluated, there is no one “gold standard” treatment. The aim of this systematic review was to investigate what treatments for female sexual pain have been evaluated in clinical studies and their effectiveness. The search strategy resulted in 65 papers included in this review. The articles were divided into the following categories: Medical Treatments; Surgical Treatments; Physical Therapies; Psychological Therapies; Comparative Treatment Studies; Miscellaneous and Combined Treatments. Topical and systemic medical treatments have generally been found to lead to improvements in, but not complete relief, of pain and side effects are quite common. Surgical procedures have demonstrated very high success rates, although there has been variability in complete relief of pain after surgery, which suggests less invasive treatments should be considered first. Physical therapies and psychological therapies have been shown to be promising treatments, supporting a biopsychosocial approach to sexual pain disorders. Although most of the interventions described have been reported as effective, many women still experience pain. A multidisciplinary team with active patient involvement may be needed to optimize treatment outcome.

**Introduction**

 Sexual pain disorders are one type of female sexual difficulty that affects women’s sexual and reproductive health and are poorly understood and often misdiagnosed (Harlow & Stewart, 2003). Vulvar pain occurring in the absence of an identified pathology is an increasingly common clinical problem and one that first appeared in the literature about 30 years ago (Moyal-Barracco & Lynch, 2003). Since then, there have been many different terms used to refer to this type of pain e.g., dysaesthetic vulvodynia, vulvar vestibulitis (VV), and idiopathic vulvar pain. Friedrich’s (1987) original criteria for VV included pain on vestibular touch or attempted vaginal entry, tenderness to pressure within the vestibule, and physical findings confined to the vestibular erythema. In 2003, the International Society for the Study of Vulvovaginal Disease (ISSVD) recommended eliminating the use of the term vestibulitis and using vulvodynia as the preferred term for vulvar pain occuring in the absence of an underlying identified disease (Moyal-Barracco & Lynch, 2003).[[1]](#footnote-1) Vulvodynia can be either generalized or localized and within each of these categories, classified as either provoked (PVD) (sexual, nonsexual, or both) or unprovoked vulvodynia.

*Classification of sexual pain disorders*

In the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013), sexual pain symptoms are classified as Genito-Pelvic Pain/Penetration Disorder (GPPPD). The diagnostic criteria for this disorder are “persistent or recurrent difficulties with one or more of the following: vaginal penetration during intercourse; marked vulvovaginal or pelvic pain during vaginal intercourse or penetration attempts; marked fear or anxiety about vulvovaginal or pelvic pain in anticipation of, during, or as a result of vaginal penetration; marked tensing or tightening of the pelvic floor muscles during attempted vaginal penetration.” (p. 437). There is also the requirement that the symptoms have persisted for a minimum duration of approximately six months and cause “clinically significant distress” in the individual. It is estimated that approximately 15% of women in North America report recurrent pain during vaginal intercourse (American Psychiatric Association, 2013).

Other definitions classify conditions by the area of the body or organ affected by pain. Intercourse may be one of many activities that provoke or aggravate pain. For example, in the European Association of Urology (EAU) guidelines, chronic pelvic pain (CPP) is defined as “chronic or persistent pain perceived in structures related to the pelvis of either men or women” (Engeler et al., 2004). Distress or interference with intercourse is not necessary for a diagnosis of CPP, even though such factors are relevant to the patient in many cases (Engeler et al., 2004). Distress is also not a requirement for diagnosis with the International Classification of Diseases (ICD)-10 system (World Health Organization, 2008).

*Etiology and associated features*

Sexual pain[[2]](#footnote-2) can result from a number of physical conditions/behaviors. Physical pathologies include increased vaginal/pelvic muscle tone, decreased vaginal/pelvic muscle strength, and restriction of the vaginal entrance (Reissing, Binik, Khalifé, Cohen, & Amsel, 2004; Reissing, Brown, Lord, Binik, & Khalifé, 2005). Women with genital pain often start puberty early and experience pain with first tampon use (Harlow, Wise, & Stewart, 2001; Landry & Bergeron, 2011), have lower pain thresholds in the vulva region and other body parts (Meana, Binik, Khalifé, & Cohen, 1997; Pukall, Binik, Khalifé, Amsel, & Abbott, 2002), and have a history of self-reported repeated yeast infections (Bachmann et al., 2006). Psychosocial factors, including fear of sexual abuse and trait anxiety, are predictors of chronic painful intercourse (Harlow & Stewart, 2005; Khandker et al., 2011; Landry & Bergeron, 2011). Findings regarding past sexual and physical abuse as predictors of sexual pain have been mixed (Harlow & Stewart, 2005; Meana et al., 1997).

Research on psychological and sexual functioning of women with sexual pain problems suggests that, compared with controls, they have higher levels of anxiety and psychological distress and lower levels of sexual satisfaction, sexual desire, and sexual self-esteem (Desrochers, Bergeron, Landry, & Jodoin, 2008; Gates & Galask, 2001; Masheb, Lozano-Blanco, Kohorn, Minkin, & Kerns, 2004) and poorer body image and genital self-image (Pazmany, Bergeron, Van Oudenhove, Vergaeghe, & Enzlin, 2013). Hypervigilance for coital pain has been demonstrated in women with vulvodynia (Payne, Binik, Amsel, & Khalifé, 2005). In a qualitative study by Ayling and Ussher (2008) the majority of women with vulvodynia regarded themselves as “inadequate” and experienced feelings of shame, guilt, and a decreased desire for sexual contact. Nunns and Mandal (1997) found that, compared with controls, women with sexual pain had higher levels of state and trait anxiety as well as less sexual arousal and more negative feelings about sexual intercourse. Women with vulvodynia also report poor quality of life (Xie et al., 2012). As well as an individual problem, sexual pain poses a huge economic burden, costing societies billions (Xie et al., 2012). This large societal and economical impact of sexual pain highlights the need for effective assessment procedures and treatment options.

Many different treatments have been evaluated for the treatment of sexual pain. These include medical treatments [topical applications (Nyirjesy, Lev-Sagie, Mathew, & Culhane, 2009; Zolnoun, Hartmann, & Steege, 2003); injections (Pelletier et al., 2011; Rapkin, McDonald, & Morgan, 2008)], surgical treatments [e.g., vestibulectomies (Lambert, Bergeron, Desrosiers, & Lepage, 2012; Tommola, Unkila-Kallio, & Paavonen, 2011)], physical therapies [biofeedback, dilators, pelvic floor exercises, and electrical stimulation (Goldfinger, Pukall, Gentilcore-Saulnier, McLean, & Chamberlain, 2009)], psychological therapies [cognitive behavioural therapy (CBT) (Engman, Wijma, & Wijma, 2010) andhypnotherapy (Pukall, Kandyba, Amsel, Khalifé, & Binik, 2007)]. Based on the evidence, some attempts have been made to produce guidelines for the management of female sexual pain problems in clinical practice (Engeler et al., 2004; Mandal et al., 2010).

*Rationale for this review*

There has been an increase in the number of treatment studies of sexual pain disorders in the past decade, which is evident by the number of reviews in this area (Landry, Bergeron, Dupuis, & Desrochers, 2008; McGuire & Hawton, 2009; Melnik, Hawton, & McGuire, 2012; Stones, Cheong, & Howard, 2005).Stones et al. (2005) reviewed interventions for treating CPP only and McGuire and Hawton and Melnik et al. (2012) reviewed only studies on vaginismus. In 2008, Landry et al. conducted a good in-depth critical review of treatments for PVD and recently Flanagan, Herron, O’Driscoll, and Williams (2014) published a systematic review and meta-analysis of psychological treatments for vaginal pain. All of these reviews, howoever, have focused on only one type of disorder. The Flanagan et al. (2014) reviews examined three disorders under the heading of vaginal pain (vulvodynia, vaginismus, and dyspareunia), but only reviewed psychological treatments.

An updated systematic review on the treatment of a broad range of female sexual pain is warranted. Unlike past reviews that have focused on single female sexual pain problems (or pelvic pain), the current review included interventions for all female sexual pain problems, including CPP. The prevalence of sexual pain in women with chronic pelvic pain is high (Verit, Verit, & Yeni, 2006). The individual, social, and economic burden of sexual pain remains significant (Ayling & Ussher, 2008; Gates & Galask, 2001; Xie et al., 2012) and there are diverse treatment options. Although recent guidelines on treatment have been published (Engeler et al., 2004), a review of the treatments will provide supporting evidence and help clinicians assess which treatments are most efficacious for sexual pain problems. Optimal treatment delivered early (soon after diagnosis) may prevent chronicization of pain and reduce associated sexual, psychological, and relationship distress.

*Objectives*

 The objectives of this systematic review of the literature were to answer the following key questions: (i) Which treatments for female sexual pain have been evaluated in clinical studies? (ii) What is the effectiveness of these treatments? (iii) When follow-ups are carried out, are improvements in sexual functioning, satisfaction, or pain maintained?

**Method**

 The guidelines outlined in the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement were used (Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009).

**Search Strategy**

A study protocol was initially formulated and reviewed by experts in the pain and sexual medicine field. Database searches were carried out in PsycINFO, Medline, Web of Science, Embase, CINAHL and The Cochrane Library. The reference lists of all articles that were identified as a result of the searches were also checked for relevant studies that may not have appeared in the databases. The title, abstract, and the introduction of all articles that initially appeared suitable were checked and screened against the inclusion/exclusion criteria. The first author and one of the co-authors (CAG) made decisions about screening and full text retrieval and determined whether a given article should be included or excluded.

The searches aimed to identify relevant studies that assessed treatments for female sexual pain. The time period of each search ranged from the start date of each database (PsycINFO: 1597; Medline: 1946; Web of Science: 1970; Embase: 1847; CINAHL: 1981; The Cochrane Library: 1898) to November 30, 2014. Past review papers acted as starting points for searches, with reference lists and key terms checked. The search terms used for each database consisted of a sexual pain term and an intervention term. Sexual pain terms that were searched included *female sexual pain*, *dyspareunia*, *vaginismus*, *sexual pain*, *vulvodynia*, *vestibulodynia*, *pelvic pain*, *vulvar pain*, *gynecologic pain*, and *vulvar vestibulitis.* Intervention-based terms included *cognitive behavior therapy*, *psychological therapy*, *behavior therapy*, *physical therapy*, *online intervention*, *internet-based*, *biofeedback*, and *vestibulectomy*. Sexual pain terms were grouped or paired with intervention terms and searched with *AND* or *OR* within each database. These search terms were chosen based on key words and headings of papers in this field as well as on previous reviews on sexual pain.

**Inclusion/Exclusion Criteria**

Randomized controlled trials (RCTs), retrospective, prospective, and cohort studies were included in the review. Studies had to report on an intervention, which could include any of the following: CBT, psychological interventions, physical therapies, medical therapies (pharmacological therapies and surgical procedures), or alternative treatments (e.g., acupuncture, hypnotherapy). Participants must have been female and either already diagnosed with a sexual pain disorder or screened and assessed as having sexual pain. Studies were included if their primary purpose was to evaluate a treatment for female sexual pain regardless of its cause. Criteria for sexual pain disorders included the DSM-IV-TR, (American Psychiatric Association, 2000), ICD-10 (World Health Organization, 2008) and Friedrich’s (1987) criteria. Participants in included studies had to be over 18 years of age.

 Studies included were required to assess, and report on, pain with sexual activity as one of the treatment outcome measures. Interventions that primarily aimed to treat physical conditions such as vaginal atrophy, endometriosis, and candidiasis were excluded, as were treatment studies involving women with pelvic pain associated with pregnancy or childbirth procedures (e.g., episiotomy). Finally, studies evaluating treatments that are no longer in use (e.g., perineoplasty) were excluded, as were case reports and studies employing qualitative designs.

**Quality Assessment**

 The Cochrane Risk of Bias criteria (Higgins & Green, 2011) were used to assess the level of bias within each study. This is a “domain-based evaluation” whereby critical assessments are made for each of a number of bias domains.

**Results**

 The search strategy resulted in 65 articles included in this review. Because of the marked heterogeneity of the studies and because the majority lacked a control or comparison group, all of the studies were narratively reviewed. The quality assessment carried out indicated that the majority of the studies reviewed had a high risk of bias related to blinding of the participants (80.3%) and blinding of the outcome assessment (68.1%); 19.7% of the studies also showed a high risk of bias related to incomplete outcome data.[[3]](#footnote-3)

The flow of papers throughout the search process is illustrated in Figure 1. The treatments were divided into the following categories: Medical Treatments; Surgical Treatments; Physical Therapies; Psychological Therapies; Comparative Treatment Studies; Miscellaneous and Combined Treatments. A summary of the studies is presented in Table 1.

**Medical Treatments**

 Medical treatments included topical applications and injections.

*Topical Treatments*

 Seven studies that assessed topical applications used to treat vulvar pain – lidocaine, capsaicin, amitriptyline/baclofen, nifedipine, cromolyn, and cream with cutaneous fibroblast lysate – were identified.

 In a prospective study, Zolnoun et al. (2003) assessed the effectiveness of nightly application of 5% lidocaine ointment, a local anaesthetic, on daily pain ratings and intercourse-related pain among 61 women diagnosed with VV. After seven weeks, 76% of the patients reported being able to have intercourse, compared with 36% before treatment, a significant increase. Only 30 of the 61 women returned the 6-month follow-up questionnaire; of these, 77% reported ongoing use of the lidocaine. Twenty percent who had stopped the treatment reported sustained improvement in their symptoms and their ability to have intercourse. Some patients (number not specified) experienced burning after applying the ointment.

 Two studies evaluated capsaicin in samples of women with VV (Murina, Radici, & Bianco, 2004; Steinberg, Oyama, Rejba, Kellogg-Spadt, & Whitmore, 2005).In a prospective

uncontrolled trial, 33 women with VV were treated with topical capsaicin (0.05%); 19 patients (59%) reportedimprovement in symptoms of dyspareunia, burning, and irritation after eight weeks of treatment (Murina et al., 2004). In a retrospective chart review, Steinberg et al. (2005) tested capsaicin cream (0.025%) in a sample of 52 women with VV; after 12 weeks, significant improvements in dyspareunia and in responses to the Kaufman touch test (evaluating discomfort) were observed. A disadvantage of capsaicin is the severe burning sensation experienced even after application of local anaesthetic cream, which limits its practicality (Murina et al., 2004; Steinberg et al., 2005).

 In a retrospective study of 38 women with PVD, Nyirjesy et al. (2009) examined the effects of amitriptyline 2%/baclofen 2% cream on vestibular pain. After a median follow-up of 33 weeks, 11 (29%) of patients reported little or no improvement, 7 (18%) moderate improvement, and 20 (53%) much improvement. Eleven (29%) reported localized burning from the treatment. Although there were significant reductions in pain during intercourse and improvement in lubrication, there were no changes in reported frequency of intercourse, sexual desire, or sexual satisfaction.

 One double-blind placebo-controlled study investigated the effectiveness of topical application of nifedipine (0.2% or 0.4%) in 30 women with PVD (Bornstein, Tuma, Farajun, Azran, & Zarfati, 2010). Reports of pain during intercourse, pain from speculum insertion, and pain assessed by the cotton swab test were lower after six weeks of treatment compared with pretreatment in all three groups. Improvements were maintained at three-month follow-up but in none of the comparisons was the effectiveness of nifedipine superior to that of placebo.

 The effectiveness of cromolyn (4%) cream in 26 women with VVS was assessed in a prospective, double-blind trial (Nyirjesy et al., 2001). After three months of treatment, although symptoms of irritation, burning, and dyspareunia had improved, there were no statistically significant differences between the active treatment and the placebo groups.

 In a double-blind placebo-controlled crossover trial, Donders and Bellen (2012) studied the effects of treatment with cutaneous lysate skin cream in 30 women with PVD. During the first 12 weeks, use of the active cream resulted in a significant reduction in pain during sexual activity compared with placebo; the reduction in pain ranged from 20-30%.

*Injections*

 Botulinum toxin type A (Botox) and nerve blockades were the two main types of injections investigated, with an additional study using enoxaparin (Farajun, Zarfati, Abramov, Livoff, & Bornstein, 2012). Botox influences pain by reducing muscle hyperactivity through a number of different pain mechanisms, including blocking presynaptic cholinergic synapses and the release of neurotransmitters involved in pain perception (Dressler & Saberi, 2005). In the studies identified, Botox (between 20-400 units) was injected either into the levator ani muscles (Bertolasi et al., 2009; Jarvis, Abbott, Lenart, Steensma, & Vancaille, 2004; Yoon, Chung, & Shim, 2007), the bulbospongiosus muscles (Abbott, Jarvis, Lyons, Thomson, & Vancaille, 2006; Peterson, Giraldi, Lundvall, & Kristensen, 2009), the puborectalis and pubococcygeus muscles (Abbott et al., 2006; Nesbitt-Hawes et al., 2013), or painful vulvar areas identified by touch with a cotton swab (Dykstra & Presthus, 2006). The majority of the studies included women with vulvar pain problems such as vulvodynia; three studies included women with CPP not limited to vulvar pain (Abbott et al., 2006; Jarvis et al., 2004; Nesbitt-Hawes et al., 2013). Botox treatment resulted in improved vaginal muscle resistance (Abbott et al., 2006; Bertolasi et al., 2009), enhanced ability to have intercourse (Pelletier et al., 2011; Yoon et al., 2007), reduced dyspareunia (Jarvis et al., 2004; Nesbitt-Hawes et al., 2013),improved overall sexual function (Peterson et al., 2009), improved quality of life (Dykstra & Presthus, 2006; Jarvis et al., 2004; Pelletier et al., 2011),and reduced pain overall (Bertolasi et al., 2009; Jarvis et al., 2004; Nesbitt-Hawes et al., 2013; Pelletier et al., 2011; Yoon et al., 2007). In Peterson et al.’s (2009) placebo-controlled study, however, there were no significant differences between Botox treatment and placebo.

 Two studies examined pudendal nerve blockade. In a prospective pilot study, Rapkin et al. (2008) investigated the effectiveness of using multilevel anaesthetic injections to target small nerve fibres that supply the vestibule, the pudendal nerves, and the sacral 2-4 dorsal root ganglia that subserve the pudendal nerve in 27 women with vestibulodynia. There were five treatment sessions every 2-3 weeks. At posttreatment, a significant improvement in pain with intercourse was found. Significant improvements were also found in vestibular pain from baseline to the last follow-up (4-6 months posttreatment). A more recent uncontrolled pilot study investigated the use of multilevel local anesthetic nerve blockade for the treatment of generalized vulvodynia (McDonald & Rapkin, 2012). Thirty-two women entered the study and 26 women completed the five treatment sessions and a follow-up session 2-3 months after treatment ended. Although there were no significant changes on the pain domain of the FSFI, in responses on a global satisfaction question (“What is the average percent improvement in your pain with intercourse?”), the mean improvement was 56%; 61% of participants stated at follow-up that sexual intercourse was “enjoyable.”

 In a randomized controlled trial, the effectiveness of enoxaparin (an anticoagulant) in treating PVD was assessed (Farajun et al., 2012). Forty women with severe PVD self-administered daily injections of either 40 mg enoxaparin or the same volume of saline solution for 90 days. Women were assessed at pretreatment, posttreatment, and three months after treatment. Compared with placebo, the enoxaparin-treated women showed significantly greater improvement in pain, pain during intercourse, and vestibular sensitivity at posttreatment and at the three-month follow up.

*Critical review – outcome studies on medical treatments*

 Most early studies that evaluated topical treatments were uncontrolled prospective trials or retrospective studies of women who had previously received treatment. More recently, some double-blind placebo-controlled trials in this area have been carried out (Bornstein et al., 2010; Donders & Bellen, 2012). Outcome studies on Botox and on pudental nerve blockage were also of mixed quality; only a small number of these were placebo-controlled (Farajun et al., 2012 on enoxaparin; Abbott et al., 2006; Peterson et al., 2009 on Botox).

**Surgical Treatments**

 Surgical treatments included vestibulectomy, modified vestibulectomy, and laparoscopic surgeries. In vestibulectomy, the hymenal ring is usually removed and/or sensitive areas in the vestibular (or the entire vestibular) are excised and tissues from the posterior fourchette down to the perineum are also removed (Goldstein, 2006; Goldstein, 2010). Five retrospective studies were found that evaluated vestibulectomy. The findings suggested that vestibulectomy can significantly reduce vulvar pain (Bergeron, Bouchard, Fortier, Binik, & Khalifé, 1997; Bohm-Starke & Rylander, 2008; Lambert et al., 2012). Follow-up varied from one to 12 years. No major complications of the surgery were reported; “minor” complications were decreased lubrication, hematomas, postoperative bleeding, infection, and Bartholin cysts, reported by 1-27% of patients (Bergeron et al., 1997; Bohm-Starke & Rylander, 2008; Goldstein, Klingman, Christopher, Johnson, & Marinoff, 2006; Traas et al., 2006).

 In modified vestibulectomy, only tender areas within the vestibule are removed and the excision is limited to the posterior fourchette of the vestibular area (Goetsch, 1996). Eight studies were identified that evaluated modified vestibulectomy. Six were retrospective (Goetsch, 1996, 2007, 2008; Kehoe & Luesley, 1996; Lavy, Lev-Sagie, Hamani, Zacut, & Ben-Chetrit, 2005; Tommola et al., 2011), one was an observational case-control study (Tommola, Unkila-Kallio, & Paavonen, 2012), and one was prospective (Kehoe & Luesley, 1999). Follow-up varied from 6 months to 14 years. One study evaluated modified vestibulectomy in conjunction with a modified Fenton’s procedure (Kehoe & Luesley, 1996, 1999), which involves the removal of scar tissue resulting from perineal trauma or tear (Chandru, Nafee, Ismail, & Kettle, 2010).

In Goetsch’s (1996) study, 10 (83%) participants reported complete resolution of vestibular tenderness. Five women (42%) described having some degree of vaginismus after surgery; for some, this resolved without treatment while others needed desensitization therapy with vaginal dilators (exact number of women not reported). Follow-up ranged from six months to six years. In a later observational study, Goetsch (2007) evaluated surgery combined with “muscle therapy” in 111 women who had dyspareunia. At three-month follow-up, 24% reported less pain during intercourse, 9% no change, and 3% were worse. In another observational study, Goetsch (2008) followed up 133 women who had undergone modified superficial vestibulectomies; 119 returned follow-up questionnaires and of these, 68% reported that they no longer had pain during intercourse, 24% said that the pain had lessened, 8% reported no improvement, and 2% were worse. In a long-term follow-up study, Tommola et al. (2011) found that 69.2% of their sample of 57 patients who attended for follow-up reported a 50% or greater decrease in dyspareunia following surgery. Posterior vestibular tenderness following surgery was absent in 34 (64.2%) women and “mild” in 11 (20.8%). Anterior vestibular tenderness was absent in 15 (28.3%) and “mild” in 14 (26.4%) women. The average length of follow-up was 36 months.

In four studies, response to surgery was defined as complete (return to normal, non-painful intercourse), partial (return to “normal” sexual intercourse; even though occasional dyspareunia existed, it did not prevent sexual activity), and non-responsive (none or minimal improvement) (Kehoe & Luesley, 1996, 1999; Lavy et al., 2005). The follow-up periods in these studies ranged from two months to ten years. In the retrospective study discussed above by Tommola et al. (2011), of 54 women, 19 (35.2%) reported complete response (cured by operation), 30 (55.6%) partial response (still had some complaints), and 5 (9.3%) no response (same or worse than before operation). Of the sexually active women, 7 (14%) reported no dyspareunia and 29 (58%) reported at least half of occasions of intercourse as painless; however, persistent dyspareunia was reported by 10 (20%) women. In an observational case-control study (Tommola et al., 2012), 66 women, all treated initially with conservative treatment, were followed up after treatment for VV. Thirty-nine women opted for modified posterior vestibulectomy because of insufficient relief from conservative management (details of conservative treatment not described). Dyspareunia decreased significantly in both surgery and conservative treatment groups from baseline to the follow-up visit. Complete response was reported by 13/36 (36.1%) women from the surgery group and 7/27 (25.9%) women from the conservative treatment group. Partial response was reported by 19 (52.8%) and 17 (63.0%) women, and no response by 4 (11.1%) and 2 (7.4%) women, respectively. Differences between the two groups, including in sexual wellbeing, were not statistically significant.

One recent study followed up 30 women three years after they had undergone vulvar vestibulectomy for PVD (Brokenshire, Pagano, & Scurry, 2014). Twenty-nine of the 30 patients were deemed to have had a good response at three months post-surgery; at the three-year follow-up, 28 women reported complete improvement (no dyspareunia), one some improvement, and one patient reported no change.

Postoperative complications following vestibulectomy were reported in a number of studies and included postoperative bleeding (Tommola et al., 2011) and postoperative pain (Lavy et al., 2005).

 Baggish (2012) prospectively evaluated 502 women that participated in a structured medical regimen for VVS. Each patient was first treated with a conservative treatment protocol that included tricyclic antidepressants or gabapentin and a low-oxalate diet recommended with a prescription of calcium citrate (either 400 mg three times daily or 1200 as a single daily dose). Patients also received biofeedback from a physical therapist. Surgery consisted of either vestibulectomy only or vestibulectomy and excision of the Bartholin glands. Participants were followed up for a minimum of 12 months. Ninety-eight (20%) women continued on the conservative treatment program with tolerably low pain during intercourse. The other 404 women (80.5%) underwent surgery. Of the 234 that underwent vestibulectomy with Bartholin gland removal, 228 (97%) reported pain-free intercourse. One hundred and seventy women underwent vestibulectomy alone and of these, 161 (95%) reported pain-free intercourse.

 One RCT investigated laparoscopic uterine nerve ablation (LUNA). Palomba et al. (2006) compared LUNA and vaginal uterosacral ligament resection for the treatment of 80 postmenopausal women with CPP. A patient was defined as “cured” if she no longer had CPP or had pain not requiring medical treatment after 6 and 12 months post-surgery. The cure rate was not significantly different between the two groups at 6 months after surgery. The severity of CPP and deep dyspareunia significantly reduced at 6 and 12 months post-surgery, with no significant differences between the two treatments.

*Critical review – outcome studies on surgical treatments*

 Almost all of the early studies that evaluated vestibulectomy and modified vestibulectomy employed retrospective and uncontrolled designs. There was a very large range of follow-up periods in these studies, with some follow-ups as short as six months post-surgery (Lavy et al., 2005). Finally, in comparison with research on some of the other treatments reviewed (e.g., physical therapies and psychological therapies) outcome measures assessed in surgical treatment studies were more likely to be limited to pain and other physical indices.

**Physical Therapies**

Studies that assessed physical therapies were grouped into the following categories: desensitization with dilators, electrical stimulation, electromyographic biofeedback, and combined physical therapy programs.

*Desensitization with Dilators*

 Two prospective studies evaluated the use of vaginal dilators alone. Murina, Bernorio, and Palmiotto (2008a) assessed the effectiveness of vaginal dilators among 15 women diagnosed with vestibulodynia who had all received previous therapies e.g., transcutaneous electrical nerve stimulation (TENS), vestibular infiltrations, biofeedback, and pelvic floor exercises. After eight weeks of treatment with dilators, there were significant improvements in dyspareunia and sexual functioning compared with pretreatment. Schnyder, Schnyder-Lűthi, Ballinari, and Blaser (1998) compared the effectiveness of two forms of desensitization exercises in treating 44 women with vaginismus: “*in vivo”* (where the physician introduced the dilator) and “*in vitro”* (the physician provided verbal instructions for introducing the dilator and the patients inserted the dilator themselves). At the end of treatment (6-7 therapeutic sessions plus homework), 43 (97.7%) of the women were able to have sexual intercourse, although 22 (50%) still experienced some pain. No significant differences were found between the *in vivo* and *in vitro* groups. At follow-up (mean 10 months posttreatment; range 6-22 months), 18 (50%) women reported that the vaginismus had completely disappeared and 17 (47.7%) reported that it had improved. The majority of patients also rated their sexual desire (14/35.9%) and orgasmic capacity (7/17.9%) as having improved.

*Electrical Stimulation*

 Three prospective studies (Fenton, Palmieri, Boggio, Fanning, & Fregni, 2009; Murina et al., 2008b; Murina, Graziottin, Felice, Radici, & Tognocchi, 2013) evaluated electrical stimulation treatments. Electrical stimulation induces analgesia and relieves pain by activating pain inhibitory pathways as well as low-threshold peripheral afferents, which inhibit nociceptive transmission to the central nervous system (Jones & Johnson, 2009).

 In an uncontrolled study, Nappi et al. (2003) investigated the use of electrical stimulation in the vulvar vestibular area in 29 women with either dyspareunia (n = 20) or vaginismus (n = 9). Treatment followed a protocol of 20 minutes of stimulation once a week for 10 weeks. At posttreatment, the contractile and resting ability of the perineal floor muscles had significantly improved and the current intensity tolerated at the vestibular area had significantly increased. Significant improvements were also found in pain and sexual functioning at posttreatment compared with pretreatment.

 In a randomized, placebo-controlled trial, Murina et al. (2008b) evaluated TENS in the management of 40 women with vulvodynia. A total of 20 treatment sessions were held for women in both groups. At posttreatment, TENS was more effective than placebo at improving sexual function, reducing pain, and reducing dyspareunia at posttreatment. At the 3-month follow-up, improvements in the TENS group were maintained. In a more recent study, Murina et al. (2013) assessed the effect of TENS in combination with either palmitoylethanolmide (PEA) + transpolydatin, an endogenous fatty acid amide, or placebo, in 20 women with vulvar pain. All of the women received 26.7 sessions of TENS. Although there were no differences between the PEA and placebo groups, dyspareunia scores had reduced significantly in both groups at posttreatment. No follow-up assessment was carried out.

 Finally, in a small controlled study, Fenton et al. (2009) compared transcranial direct current stimulation (tDCS) with sham treatment in reducing CPP. Seven women with refractory CPP were randomized to receive either active or placebo tDCS. Patients were then crossed over to receive the alternative treatment. Pelvic pain scores were significantly lower two weeks after tDCS treatment compared with sham therapy, but intercourse-related pain *increased* significantly with the active treatment compared with placebo.

*Electromyographic Biofeedback (EMG)*

 It has been suggested that hypertonicity of the pelvic floor muscles (PFMs) is partly responsible for aggravating vulvo-vaginal pain (Landry et al., 2008). EMG biofeedback aims to destabilize the PFMs (Glazer, Rodke, Swencionis, Hertz, & Young, 1995), which in turn is expected to resolve the pain. Three studies investigated EMG biofeedback in women with vestibulodynia (Glazer, 2000; Glazer et al., 1995; McKay et al., 2001). Glazer and colleagues (Glazer, 2000; Glazer et al., 1995) evaluated a standardized protocol consisting of resting baseline, muscle contraction periods, and periods that alternated between resting and contracting. McKay et al. (2001) used a similar protocol consisting of an initial assessment of the PFMs. In all of these three studies, women were instructed to use a portable EMG at home. Treatment lasted a mean of 8.7 months in one study (Glazer, 2000) and 16 weeks in the study by Glazer et al. (1995); duration was not reported in the study by McKay et al. (2001).

 Glazer (2000) and Glazer et al. (1995) found significant reductions in vulvar and sexual pain at follow-up; sexually active patients reported a significant increase in intercourse frequency. In the study by McKay et al. (2001) 15 (51.7%) of the 29 women reported significantly reduced introital tenderness and of this group 14 (93.3%) were able to resume intercourse without discomfort. Five women (17.2%) reported no improvement in symptoms and none of these resumed sexual intercourse.

*Combined Physical Therapy Programs*

 Combined physical therapy programs are those comprising a combination of physical therapies, including EMG biofeedback, electrical stimulation, vaginal dilators, and education (e.g., on the role of the PFMs in maintaining pain). Three studies that assessed physical therapy programs were identified.

 In a retrospective study, Bergeron et al. (2002) assessed the effectiveness of physical therapy in improving painful intercourse and sexual function in a sample of 35 women diagnosed with VV. Physical therapy comprised manual techniques (e.g., stretching), EMG feedback, electrical stimulation, and home exercises. There were seven sessions of treatment and the mean length of treatment follow-up was 15.8 months. Results indicated a complete or “great” improvement for 51.4% of participants, moderate improvement for another 20.0%, and little to no change for the remaining 28.6%. There was a significant decrease in pain experienced not only during sexual intercourse, but also during gynecological examinations; increases in intercourse frequency and levels of sexual desire and arousal were also reported.

 Goldfinger et al. (2009) prospectively examined the effectiveness of a comprehensive pelvic floor physical therapy (PFPT) intervention in treating pain and improving sexual and psychological functioning in 13 women with PVD. The PFPT intervention comprised eight sessions of intravaginal manual techniques, EMG, vaginal dilators of increasing diameters, and home exercises. The women were assessed before treatment, within one month after treatment, and between three and four months after treatment. Significant reductions in all pain measures, including pain during intercourse, were found at posttreatment assessments. Significant improvement also occurred for overall sexual function, but not for specific components of sexual function (desire, arousal, lubrication, and orgasm). No significant changes were found in depression and anxiety scores or in intercourse frequency. Treatment was reported as successful (“complete cure” or “great improvement” in vulvar pain) for 10 (77%) participants and unsuccessful for 3 (23%) women.

 In an open, randomized study, Heyman, Öhrvik, & Leppert (2006) evaluated the effects of dorsal stretching of pelvic structures in 50 women with CPP who were randomized to either a treatment (distension) (n = 25) or control group (n = 25). Distension of painful structures was done using the physician’s index finger. At posttreatment assessment 2-3 weeks after the second session, compared with controls, the treatment group had greater reductions in the intensity, frequency, and duration of pelvic pain, painful intercourse, mental fatigue, and depression.

*Critical review – outcome studies on physical therapies*

 This category comprised a heterogeneous group of therapies and the methodological quality of the studies was similarly quite mixed. There were three controlled studies identified (Heyman et al., 2005; Murina et al., 2008b; 2013) but all of the other studies used uncontrolled prospective designs. Some of the studies reviewed also had very small sample sizes and few involved any long-term follow-up.

**Psychological Therapies**

 Psychological therapies were divided into cognitive behavior therapy (CBT) approaches and other psychological interventions. CBT is a psychological therapy which aims to increase an individual’s pain control and ultimately, reduce pain in the sexual situation (ter Kuile & Weijenborg, 2006). Pain and sexual coping strategies are practiced, which are expected to reduce muscle contraction in the pelvic floor and in turn lead to the promotion of lubrication during sexual activity (ter Kuile & Weijenborg, 2006). Other components of CBT include cognitive restructuring (to adjust maladaptive pain/sexual cognitions), gradual desensitization, and relaxation techniques (Engman et al., 2010). Although a psychological therapy, CBT programs commonly include physical therapy techniques such as vaginal dilation (carried out by the patient) and other components such as sensate focus. Sensate focus is a technique developed by Masters and Johnson (1970) which comprises a series of touching exercises engaged in by couples, designed to increase sexual awareness and communication between partners.

*Cognitive Behavior Therapy Approaches*

 Corsini-Munt, Bergeron, Rosen, Mayrand, and Delisle (2014) conducted a pilot study of a novel cognitive-behavioral couple therapy for women with PVD. Eight couples completed the 12-session manualized intervention, which included psychoeducation about pain, communication skills training, and mindfulness, but also utilized an acceptance and commitment approach. The primary outcome measure was women’s pain intensity during intercourse. There was a significant decrease in dyspareunia from pre- to post-treatment and also improvements in sexual functioning and sexual satisfaction for both partners (no follow-up assessment was reported). Improvements in pain-related cognitions, anxiety, and depression were also evident for both partners. This was the first treatment study that has systematically included the partner.

In a prospective open trial, ter Kuile and Weijenborg (2006) investigated whether CBT was effective for 76 women with VVS. A total of 12 2-hour treatment sessions over a period of six months took place, with six to eight women participating in each group. The sessions comprised education about pain in relation to anxiety, information about muscle contraction as a consequence of pain and fear of pain, and information about sexuality. Specific information was given regarding how pain or the thought of pain resulting from VVS can affect sexual arousal and lubrication and sexual desire. Training in coping, self-statements, and cognitive restructuring was also provided. Progressive muscle relaxation, suggestive relaxation, abdominal breathing, and vaginal dilation by insertion of one or two fingers (by the women themselves or by the partner) were practiced. Women completed the exercises alone in the first half of the program, with partners becoming more involved in the second half of the program, which focused on general communication and sensate focus exercises. Intercourse was eventually reintroduced in a step-by-step fashion. Women were assessed one week and three months after treatment. Significantly lower levels of pain during intercourse were reported at one week posttreatment, as well as reductions in sexual dissatisfaction, vestibular pain, and vaginal muscle tension. Significantly higher scores for perceived pain control were observed one week posttreatment compared with baseline.

 Engman et al. (2010) retrospectively assessed the “long-term coital behavior” of 59 women treated with a CBT program for superficial coital pain and vaginismus. The women were on a wait-list for an average of three months before starting CBT treatment, which consisted of either weekly or bi-weekly sessions of systematic desensitization, with stepwise exposure to the penetrative situation and concurrent relaxation of the PFMs. Participants required an average of 14 (8-26) treatment sessions (treatment ended when individual goals had been reached). Successful therapy was measured as the ability to have intercourse without pain. Forty-four women returned the treatment evaluation questionnaire (74.6% response rate). The average follow-up was 39 months after treatment (range 16-79). At follow-up, a majority (61%) rated their ability to have intercourse without pain as 6 or higher (on a scale from 0–10), and 61% rated their ability to enjoy intercourse as 6 or higher (on a scale from 0–10). The proportion of women with positive treatment outcome at follow-up ranged from 81% (able to have intercourse) to 6% (able to have pain-free intercourse). A large proportion of women had reached their individualized goals [intercourse without pain: 30 (71%); intercourse without fear: 28 (80%); ability to enjoy intercourse: 26 (63%); becoming pregnant: 17 (77%)]. There was also an increase from assessment to follow-up in self-worth “as a sex partner,” “as a woman,” and “as a human being.” However, despite being called “CBT,” most of the program consisted of behavior therapy techniques (e.g., systematic desensitization and relaxation of the PFMs), with little description of the cognitive therapy techniques used.

In an RCT, Masheb, Kerns, Lozano, Minkin, and Richman (2009) compared CBT versus supportive psychotherapy (SPT) in 50 women with vulvodynia. Women received either 10 weekly 60-minute sessions of CBT or SPT. The SPT used was non-directive and controlled for the specific behavioral interventions in CBT. Forty-two women completed the 10-week treatment sessions and 47 completed 1 year-follow-up assessments. At posttreatment participants in both groups had statistically significant improvements in self- and physician-reported pain severity, sexual function, depression, and pain anxiety. CBT resulted in significantly greater improvements in physician cotton-tip measures of pain severity from pre- to post-treatment, but the effect size was not significant relative to SPT. CBT also resulted in significant pre- to posttreatment improvements in sexual function and pain during sexual intercourse relative to SPT. At one-year follow up (n = 47) improvements were maintained in both groups.

In a randomized waiting-list controlled trial, van Lankveld, Everaerd, and Grotjohann (2001) evaluated the use of cognitive-behavioral bibliotherapy (CBB) with minimal therapist support. This study involved couples with a number of different sexual dysfunctions; only the results related to women with dyspareunia and vaginismus are discussed here. Twenty couples with a sexual pain problem received bibliotherapy (12 vaginismus, 8 dyspareunia) and 35 were allocated to the waiting-list control group (17 vaginismus, 18 dyspareunia). CBB lasted 10 weeks, followed by a 10-week follow-up period. Couples in the CBB group were given a treatment manual that consisted of a step-by-step program of individual and partner exercises, using a sensate focus approach. At posttreatment, for women with vaginismus, the CBB group had greater improvement than the controls in sexual intercourse frequency, vaginismus, anorgasmia, and self-esteem as a sexual partner. For women with dyspareunia, CBB was only effective in improving sexual intercourse frequency and self-esteem as a sexual partner and these women reported more complaints of vaginal discomfort with CBB. At the 10-week follow-up, these differences were maintained. Overall, the findings suggested that CBB may be more effective for women with vaginismus than women with dyspareunia.

In another randomized wait-list controlled trial, therapist-aided exposure was evaluated as a treatment for 70 women with lifelong vaginismus and their partners (ter Kuile, Melles, de Groot, Tuijnman-Raasveld & van Lankveld, 2013). The intervention involved graded exercises using dilators or fingers, verbally “directed” by the therapist, homework exposure assignments (alone and involving the partner). Systematic assessment carried out included daily diaries, validated questions on sexual functioning and distress, and physical examination. Seven participants dropped out of the study before the 12-week assessment. Treatment was associated with clinical improvement in pain during intercourse, as well as in vaginismus, coital fear, and sexual distress. Thirty-one out of 35 patients in the active treatment group reported having had sexual intercourse at posttreatment vs. four out of 35 in the wait-list control group.

*Other Psychological Interventions*

In a retrospective study, Ben-Zion, Rothschild, Chudakov, and Aloni (2007) examined the effectiveness of surrogate partner therapy compared to “traditional” couples therapy for women with vaginismus. Sixteen patients who had been treated with their partner (traditional couples therapy) were compared with 16 patients who underwent therapy with a male surrogate partner. The first stage of treatment involved dilators and tampon or finger insertions. The second stage involved joint sensate focus exercises with the partner or surrogate as part of a progression towards vaginal penetration. All 16 women in the surrogate group achieved successful pain-free sexual intercourse, compared to 12 in the couples therapy group. One patient from the couples therapy group reported no change, another reported being much worse, and two women described mildly positive changes.

 Brotto, Sadownik, and Thomson (2010) prospectively investigated the effectiveness of three one-hour gynaecologist-led educational seminars on psychological symptoms and sexual health among 29 women with PVD. The overall goal of the seminars, each involving 4-8 women, was to disseminate accurate information about PVD and there were opportunities for participants to ask questions as well as share experiences with other group members. There were significant improvements in sexual functioning from pre- to posttreatment assessments that were maintained at the 6-month follow-up. Significant improvements were also seen in psychological symptoms, including sexual distress, depression, anxiety, hostility, paranoid ideation, psychoticism, and somatization, but no significant improvements in sexual pain scores were found at either posttreatment or follow-up.

*Critical review – outcome studies on psychological therapies*

 Overall, the methodological quality of the outcome studies on psychological therapies, particularly those on CBT, was high. There have been a number of RCTs conducted e.g., Masheb et al., 2009; ter Kuile et al., 2013; van Lankveld et al., 2001. Many of the studies also assessed a broad range of variables (e.g., self-esteem as a sexual partner; van Lankveld et al., 2001 and coital fear; ter Kuile et al., 2013), as well as pain and sexual activity.

**Comparative Treatment Studies**

 Most of the studies reviewed above only investigated one type of treatment, without making comparisons with other treatment types. Five studies met our criteria that compared different types of treatment (Bergeron et al., 2001; Bergeron, Khalifé, Glazer, & Binik, 2008; Bergeron, Khalifé, Dupuis & McDuff, 2015; Danielsson, Torstensson, Brodda-Jansen, & Bohm-Starke, 2006; Foster et al., 2010).

 Bergeron et al. (2015) conducted a randomized trial comparing group CBT therapy with a topical steroid for women with dyspareunia. Ninety-seven women were randomly assigned to one of the two treatments and assessed at pretreatment, posttreatment, and six-month follow-up using validated measures of pain, psychological and sexual functioning, structured interviews, and a gynaecological examination. Women in both treatment groups reported statistically significant reductions in pain (at posttreatment and at six-month follow-up), but the women in the group CBT condition had greater improvements in pain at six-month follow-up and higher treatment satisfaction than those in the topical steroid group.

 In an earlier RCT, Bergeron and colleagues (2001) randomized 78 women with dyspareunia to either group cognitive behavioral therapy (GCBT), sEMG biofeedback, or vestibulectomy. Biofeedback involved self-insertion of a small single-user sEMG sensor into the vagina involving phasic contractions and rest periods; participants in this group received eight 45-minute sessions over a 12-week period. GCBT consisted of two-hour group sessions with 78 women per group, and included education and information about vulvar pain, sexual anatomy, progressive muscle relaxation, abdominal breathing, Kegel exercises, vaginal dilation, distraction techniques, coping self-statements, communication skills training, and cognitive restructuring. Participants from all three groups reported significant reductions on all pain measures at posttreatment and six month follow-up. At posttreatment and at the 6-month follow-up, vestibulectomy was significantly more successful at reducing vestibular pain than sEMG and GCBT. Vestibulectomy was also significantly more effective at reducing intercourse-related pain at posttreatment and 6 month follow-up than sEMG. All three treatments were equally effective at improving sexual function and psychological adjustment. Participants were followed up after another 2.5 years, and reassessed using the same procedures as in the original study (Bergeron et al., 2008). Women had significantly less pain at 2.5 years compared to the six-month follow-up and vestibulectomy participants again had significantly lower vestibular pain levels than sEMG and GCBT. The results also indicated that vestibulectomy was significantly more effective than sEMG at reducing pain during intercourse at the 2.5 year follow-up. No further improvements were found on the sexual function measures, which did not change between six months and 2.5 years.

 In another RCT, Danielsson et al. (2006) evaluated EMG biofeedback and topical lidocaine gel as a treatment for 46 women diagnosed with VV. Biofeedback was carried out with home training exercises and computerized assessments of the PFMs. Three biofeedback training sessions were arranged across the four-month study period. Nine of the 46 women dropped out. Both treatment groups showed significantly improved values for vestibular pain thresholds, QoL measurements, sexual functioning, and sexual pain at the 12-month follow-up, with no between-group differences found.

 Foster et al. (2010) evaluated lidocaine cream (5%) and/or 25 mg. desipramine tablets compared with placebo as a treatment for 133 women with PVD. There were four treatment groups: placebo tablets–placebo cream, desipramine tablets–placebo cream, placebo tablets–lidocaine cream, and desipramine tablets–lidocaine cream. At week 12, improvements in pain, psychological wellbeing, and sexual satisfaction were found in all groups. Desipramine alone and lidocaine alone were not superior to placebo. Improvements were also found in the cotton-swab test and in pain with intercourse across all treatment groups. Across all of the outcome measures, one measure - sexual satisfaction - improved with desipramine compared with placebo. The highest drop-out rates as well as the most significant side-effects (e.g., dry mouth, hot flushes, dizziness or light-headedness) were found in the desipramine group.

*Critical review – outcome studies on comparative treatments*

 All but one of the five comparative treatment studies was carried out in the last decade and perhaps reflecting this, the methodological quality of these studies was good. All of the five studies identified used randomized controlled designs. Outcome data were comprehensively reported and one of the studies (Bergeron et al., 2008) was a long-term follow-up study undertaken 2.5 years after the initial treatment (Bergeron et al., 2001).

**Miscellaneous and Combined Treatments**

 Miscellaneous treatments identified include acupuncture (Curran, Brotto, Fisher, Knudson, & Cohen, 2010) and hypnosis (Pukall et al., 2007). Other studies combined different treatments e.g., topical treatments and surgery (Har-Toov, Militscher, Lessing, & Abramov, 2001; Pagano, 1999; Spoelstra, Dijkstra, van Driel, & Weijmar Schultz, 2011; Ventolini, Barhan, & Duke, 2009).

 Curran et al. (2010) assessed eight women with PVD who received 10 acupuncture sessions. After 10 1-hour treatment sessions, the only significant improvement regarding pain-related measures was for pain during manual genital stimulation and cognitions related to helplessness. No significant improvements in the intensity of pain during sexual intercourse, ability to have intercourse, emotional well-being, self-confidence, restful sleep, or energy were observed, although the authors acknowledged that the small sample size limited conclusions that could be drawn.

 Pukall et al. (2007) conducted a pilot study to investigate the effectiveness of hypnosis as a treatment for VVS. Patients were initially screened using the Harvard Group Scale of Hypnotic Susceptibility, which assessed response to hypnosis. Women were included if they scored in the moderate-high range in hypnotic susceptibility. The six hypnosis therapy sessions included suggestions related to relaxation, pain control and reduction, and sexual pleasure. Significant improvements from baseline to one- and six-month follow-up were found on measures of pain during cotton-tip palpation, intensity, unpleasantness, and frequency of pain during intercourse, and frequency of pain during non-coital activities. Satisfaction and perceived improvements did not significantly differ between the one and six month follow-ups and overall ratings were reported as “average.”

 In an early uncontrolled trial, Pagano (1999) investigated a management protocol as a treatment for 230 women with PVD, first involving simple local measures such as recommending lubricant use during intercourse, then treatment of Candida for those who were Candida-positive, and Amitriptiline or Carbamazepine for women who were Candida negative. Amitriptiline had positive effects in 60% of women and Carbamazepine in 13% of women. For patients not responding to any of the above measures, surgical vestibulectomy was performed (n = 22) and 20 women (91%) were said to experience “significant improvement.”

 Har-Toov et al. (2001) investigated the effect of treating vaginismus before VVS in 35 women presenting with both problems. Vaginismus was initially treated using self-inserted dilators and concomitant psychological counseling. VVS was then treated only if dyspareunia symptoms persisted after the vaginismus was successfully treated. The VVS treatment protocol included: avoiding irritants; a low-oxalate diet; application of Ovestin ointment; and biofeedback. Of the 13 women who followed the treatment protocol, six women could have intercourse without any pain, two had minimal pain, three had minimal pain reduction, and three had persistent severe pain and had to be referred for surgical treatment.

 In another prospective study involving a “stepwise” approach to treatment, Ventolini et al. (2009) assessed the effects of several different treatments on 74 women presenting with vulvodynia. Approaches used included antibiotic treatment, dietary modification, tricyclic antidepressants, Gabapentin, pelvic floor physical therapy, and psychological counseling. Participants were assessed after each “step.” With this regimen, a total of 56 patients improved and achieved “satisfactory” sexual intercourse.

 Spoelstra et al. (2011) retrospectively evaluated an individualized, multifaceted, and multidisciplinary treatment program for 70 women with PVD. The program consisted of information about PVD, an educative “gynecosexological examination,” prescription of an inert cream to protect the vestibular area, EMG biofeedback, homework assignments consisting of self-exploration, the use of dilators, and lubrication, a hygienic protocol (e.g., no vaginal douching), and normalizing, reframing, and encouraging sexual activity without penetration. If needed, psychotherapy in the form of either individual sexological counseling or sexological partner-relation therapy was also offered. In cases of persistent PVD, surgical intervention was performed alongside the multifaceted program. The average duration of treatment was 148 weeks and mean follow up was five years. Post-treatment, 52 (80%) of the women had resumed sexual intercourse; however, only 5 women reported completely pain-free intercourse. There were significant reductions in reported vulvar pain at follow-up.

*Critical review – outcome studies on miscellaneous and combined treatments*

 The methodological quality of the studies in this category was poor. Most of the studies identified were uncontrolled or used retrospective assessment. Some were initial pilot studies of a new treatment e.g., Pukall et al., 2007). Nonetheless, because of the high risk of bias inherent in these studies, reported findings should be interpreted with caution.

**Discussion**

The aim of this systematic review was to investigate what treatments for female sexual pain have been evaluated in clinical studies and their effectiveness. For many women who present to physicians with sexual pain, no cause can be easily established and no specific disorder diagnosed. Thus, we made the decision to include treatments about all types of sexual pain rather than focus on single sexual pain disorders. Our approach is consistent with those of other recent reviews (Flanagan et al., 2014) and with recent changes in the DSM-5 (APA, 2013) where the categories of Dyspareunia and Vaginismus have been collapsed into one disorder: Genito-Pelvic Pain/Penetration Disorder. A review of the evidence about which treatments are most efficacious for women presenting with sexual pain symptoms should help clinicians decide which treatment to consider.

A large number of treatment approaches exist, which can make it difficult for clinicians to decide on the best approach for patients. Topical and systemic medical treatments have generally been found to lead to reductions in, but not complete relief of, pain. In addition, side effects are quite common and for this reason, some guidelines suggest that topical treatments should be used with caution (Mandal et al., 2010). There are a disproportionate number of studies that have investigated Botox compared with other medical treatments; although some of these have shown promising results, in some cases this treatment fared no better than placebo (Peterson et al., 2009). This demonstrates the importance of the inclusion of a control group which, as will be discussed below, was lacking in the majority of the studies. Overall, different treatments need to be prescribed to different women depending on their tolerability and women’s preferences.

Surgical procedures have demonstrated high success rates. Vestibulectomy has been shown to be effective in increasing sexual frequency (Bergeron et al., 1997; Lambert et al., 2012; Traas et al., 2006), improving women’s quality of sexual life and psychological well-being (Bohm-Starke & Rylander, 2008), and decreasing pain during sexual intercourse (Goldstein et al., 2006; Traas et al., 2006), although the proportion of women reporting complete relief of symptoms has varied across studies (Kehoe & Luesley, 1996, 1999; Lavy et al., 2005; Tommola et al., 2011). Such variability in complete relief of pain after surgery suggests less invasive treatments should be considered first by women before undergoing surgery. Indeed, in one long-term follow-up study, response to surgery was comparable to that achieved by conservative management (Tommola et al., 2012). If surgery is preferred, the choice of surgery should depend on the individual patient’s problem (e.g., laparoscopic surgeries will be better suited to women with endometriosis or paracolic adhesions) and counseling and support should be provided both pre- and post-surgery (Mandal et al., 2010).

 Non-medical treatments have also been demonstrated as effective in a number of studies. Physical therapies, including the use of dilators, electrical stimulation, EMG biofeedback, and physical therapy, as well as programs that encompass a combination of physical therapies, have shown promising results in some studies. The same is true for some psychological therapies, in particular CBT. This supports a biopsychosocial approach to the sexual problems, as benefits can be achieved from a number of treatment modalities to relieve pain and improve sexual function and psychological adjustment (Bergeron et al., 2001; Bergeron et al., 2008; Danielsson et al., 2006). Unlike most of the medical and surgical studies, a larger number of psychological and physical therapy studies have also investigated psychological well-being and sexual satisfaction, which have improved as a consequence of treatment (Goldfinger et al., 2009; ter Kuile & Weijenborg, 2006). Although small in number, studies involving other treatments such as acupuncture (Curran et al., 2010) and educational seminars (Brotto et al., 2010) have suggested promising results related to improved sexual function and well-being.

 An approach to treating different sexual pain problems may be to follow a “step-wise” individualized treatment protocol, which has the advantage of including a number of treatment modalities and helps eliminate possible aetiologies of the problem (Baggish, 2012; Har-Toov et al., 2001; Pagano, 1999; Ventolini et al., 2009). The integration of different treatment modalities is further supported by studies that have shown combined treatments to be effective (Bergeron et al., 2015).For example, integrating pelvic floor rehabilitation and CBT has been recommended, although there has been only one controlled trial on integrating these two treatments (Bergeron, Morin, & Lord, 2010).Multidisciplinary involvement has also been suggested in the EAU and other guidelines (Engeler et al., 2004; Mandal et al., 2010).

*Methodological shortcomings of previous research*

A number of common limitations across the studies reviewed are evident. First, many studies lacked a control group and the high placebo response demonstrated, as well as the observation that women with provoked vulvodynia tend to experience reductions in pain irrespective of whether they receive treatment or not (Davis, Bergeron, Binik, & Lambert, 2013),underlines the need to have control groups in treatment outcome studies. Second, there is a need to ensure that clinically relevant outcomes, comparable across studies, are measured. Third, the lack of long-term follow-up in the majority of studies is concerning; for example, more than half of the studies investigating either medical or psychological treatments did not include any long-term follow-up. Fourth, in most studies the clinical significance of the reported findings was not established. The IMMPACT recommendations for core outcome measures for chronic pain clinical trials provide a reference point for researchers to use for what constitutes clinically significant pain reduction, anxiety reduction, etc. (Dworkin et al., 2005).

*Future research and clinical directions*

 Although most of the interventions described have been reported as effective, many women still experience pain. Studies that investigate the differences between those women that respond and those that do not respond to specific treatments are needed. Further research on mediators of treatment response should be carried out. Sexual pain problems are likely to involve multiple mechanisms, some with a clear management pathway, while others may not be so straightforward (Engeler et al., 2004). Future studies should also focus on evaluating the clinical utility of the DSM-5 criteria for GPPPD, which focus more on fear of pain and penetration than previous diagnostic criteria (American Psychiatric Association, 2013). Finally, as highlighted by Corsini-Munt et al. (2014), current interventions focus almost exclusively on the woman, despite the accumulating evidence that responses by the male partner may have an impact on women’s pain and pain behaviors. Future research should prioritize the development and evaluation of couple therapy approaches. A move away from the focus on intercourse as a goal of treatment is also needed. In clinical settings, the importance that women and their partners (and sometimes clinicians) place on intercourse needs to be challenged. Couples can be guided and counseled to find mutually pleasurable sexual activities that may or may not include penetration. The development and evaluation of integrated treatment programs pose unique challenges, but these programs may provide the best means to target the multidimensional features of sexual pain disorders (Bergeron et al., 2010).

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67 papers identified through the reference list of past reviews

16,280 of records identified through database search

16,347 screened

59 excluded:

* 1–Participants <18 years old
* 2–Women enrolled not assessed as having sexual pain
* 2–Not an intervention study
* 1–Pain related to pregnancy/childbirth procedures
* 5–Treatment focuses on treating physical condition and not pain
* 9–Treatment not in current use
* 39–No outcome assessment of pain during sexual activity

124 of full texts assessed for eligibility

65 included in review

Figure 1: Flow of Papers during the selection process (duplicates were automatically removed from the search results by the database). Records refer to the total number of search results retrieved from the databases.

1. The term vulvar vestibulitis will only be used when we discuss earlier studies where researchers employed this term to refer to participant inclusion criteria. [↑](#footnote-ref-1)
2. For this review, the term “sexual pain” is used throughout because the focus is on treating pain associated with sexual activity. It is acknowledged that other aspects of pelvic pain/vulvar pain (e.g., daily pain, discomfort, difficulty with daily activities) are also important. [↑](#footnote-ref-2)
3. Because of space constraints, the detailed results from application of the Cochrane Risk of Bias criteria are not presented but are available from the authors upon request. [↑](#footnote-ref-3)