

# Mindfulness and cognitive behavioral therapy for managing vulvodynia: A literature review

Eva Christina Jåfs

Medicine kandidat

Medicinska fakulteten

Helsingfors universitet

Helsingfors 01.02.2021

Fördjupad avhandling

Handledare: Doc Maija Jakobsson

Dr Päivi Tommola

Tiedekunta/Osasto – Fakultet/Sektion – Faculty		Laitos – Institution – Department	
Medicinska fakulteten		Institutionen för medicin	
Tekijä – Författare – Author			
Eva Christina Jåfs			
Työn nimi – Arbetets titel – Title			
Mindfulness and cognitive behavioral therapy for managing vulvodynia: A literature review			
Oppiaine – Läroämne – Subject			
Medicin			
Työn laji – Arbetets art – Level	Aika – Datum – Month and year	Sivumäärä - Sidoantal - Number of pages	
Fördjupad avhandling	01.02.2021	25	
Tiivistelmä – Referat – Abstract			
<p>Vulvodyni är en mångfacetterad störning som kännetecknas av intensiv smärta i vulvan, oftast beskrivs den som en rå, brännande eller svidande känsla. Berörda kvinnor samt deras partners lider av nedsatt livskvalitet som till och med kan leda till infertilitet eftersom de kan behöva avstå från sexuellt samlag. Trots dess höga prevalens kvarstår klyftor i kunskap och tillgång till hälsovård för kvinnor drabbade av vulvodyni. Med tanke på dess varierande kliniska manifestation och inget allmänt accepterat behandlingsprotokoll har behandlingsalternativen för vulvodyni varit otillräckliga och smala i fokus. De har mest fokuserat på den fysiska smärtan som är förknippad med störningen. Som en mångfacetterad störning bör behandlingen ta hänsyn till psykosociala aspekter av läkning snarare än att endast fokusera på fysisk smärta. Patienten behandlas individuellt i ett multiprofessionellt samarbete med läkare, fysioterapeut, sexual terapeut samt psykolog. Aktuella publikationer om mindfulness och kognitiv beteendeterapi indikerar att dessa typer av behandlingar är effektiva mot kronisk smärta. Mindfulness och kognitiva beteendeterapier är icke-invasiva, effektiva på lång sikt och minskar sexrelaterad stress.</p>			
Avainsanat – Nyckelord – Keywords			
Mindfulness and cognitive behavioral therapy; dyspareunia; provoked vulvodynia;			
mindfulness; vestibulodynia			
Säilytyspaikka Förvaringställe – Where deposited			
Helda			

## Abstract

Vulvodynia is a multifaceted disorder characterized by intense vulvar pain, most often reported as a raw, burning, or stinging sensation. Affected women and their partners suffer from impaired quality of life which can even lead to infertility since they may have to abstain from sexual intercourse. Despite up to 15% prevalence there remain gaps in knowledge and treatment options for vulvodynia. Many treatments predominantly address the physical pain associated with the disorder but being multifaceted, treatment should address psychosocial aspects of healing rather than solely focusing on physical pain. Current publications regarding mindfulness and cognitive behavioral therapy indicate that these types of treatment are effective for chronic pain conditions. Mindfulness and cognitive behavioral therapies can offer significant improvements in pain, pain catastrophizing, mood, and sex-related distress while being noninvasive and efficacious long term.

1 Introduction.....	5
1.1 Vulvar anatomy.....	5
1.2 Vulvodynia.....	6
1.2.1. Definition and classification.....	6
1.2.2 Localized provoked vestibulodynia (LPV).....	7
1.2.3 Spontaneous vulvodynia.....	7
1.2.4 Etiopathogenesis.....	7
1.3 Treatment options.....	8
1.3.1 Vulvar care measures.....	9
1.3.2 Medical treatment.....	9
1.3.3 Physical therapy.....	9
1.3.4 Psychosocial treatments.....	10
1.3.5 Surgery.....	10
1.3.6 A multidisciplinary approach.....	10
2 Objectives.....	10
3 Material and methods.....	10
4 Results.....	11
4.1 Psychological interventions.....	12
4.2 Cognitive behavioral therapy.....	12
4.2.1. Mindfulness for chronic pain.....	16
4.2.2 Mindfulness-based cognitive behavioral therapy.....	18
5 Discussion.....	23

# 1 INTRODUCTION

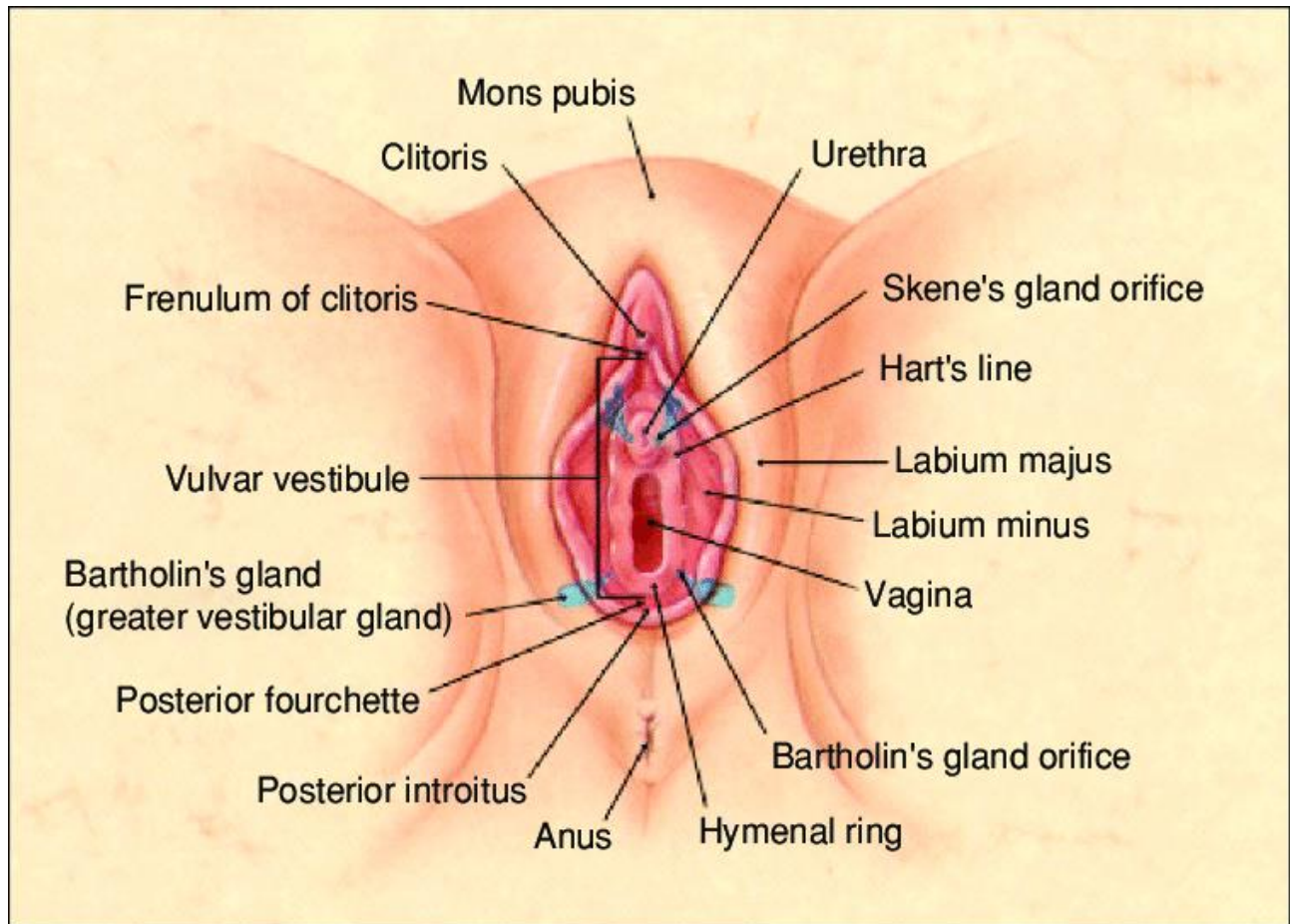
## 1.1 Vulvar anatomy

The female reproductive system consists of internal sex organs and external genital structures. External genitalia consist of the following parts, which are collectively referred to as the vulva and have stratified squamous epithelium; mons pubis, labia majora, labia minora, clitoris and vulvar vestibule. Mons pubis is the rounded prominence over the pubic symphysis, formed by subcutaneous adipose tissue, Labia majora are two large longitudinal folds of skin, homologous to the skin of the scrotum, that extend from the mons pubis and form the lateral boundaries of the urogenital cleft. They contain a thin layer of smooth muscle that resembles the dartos muscle of the scrotum and a large amount of subcutaneous adipose tissue. The outer surface, like that of the mons pubis, is covered with pubic hair. Sebaceous and sweat glands are present on both surfaces. (1)

The labia minora are paired, hairless folds of skin that boarder the vestibule and are homologous to the skin of the penis. Abundant melanin pigment is present in the deep cells of the epithelium. The core of connective tissue within each fold is devoid of fat but does contain numerous blood vessels and fine elastic fibers. Large sebaceous glands are present in the stroma. The clitoris is an erectile structure that is homologous to the penis. Its body is composed of two small erectile bodies, the corpora cavernosa; the glans clitoris is a small, rounded tubercle of erectile tissue. The skin over the glans is very thin, forms the prepuce of the clitoris, and contains numerous sensory nerve endings. The inside of the inner lips marking the change from the outer vulval skin to the smoother skin of the vestibule is the Hart's line. (1,2)

The vulvar vestibule is lined with stratified squamous epithelium. Numerous small mucous glands, the lesser vestibular glands (also called Skene's glands) are present primarily near the clitoris and around the external urethral orifice. The large, paired greater vestibular glands (also called Bartholin's glands) are tuboalveolar glands about 1cm in diameter and are located in the lateral wall of the vestibule posterior to the bulb of the vestibule. The greater vestibular glands secrete lubricating mucus. The ducts of these glands open into the vestibule near the vaginal opening. (1)

**Figure 1** The anatomy of the vulva and specifically the vulvar vestibule which is often the painful area in localized provoked vulvodynia, Goldstein et al 2009 (3).



## 1.2 Vulvodynia

### 1.2.1. Definition and classification

Vulvodynia is chronic pain or discomfort in the vulva of at least 3 months' duration, without a clear identifiable cause (4). In addition, other etiological factors should be excluded: vulvar skin diseases such as lichen sclerosus, lichen planus and psoriasis. Other exclusionary diagnoses include ulcerative diseases of the vulva, e.g., genital herpes and other types of vulvovaginitis (e.g., yeast infection, bacterial vaginosis and chronic vaginitis caused by aerobic bacteria). Treating the inflammation does not cure vulvodynia, as symptoms continue even though the inflammation improves. (5) Estrogen deficiency due to menopause or lactation-related amenorrhea is also a possible cause of pain in the vulvar mucosa. (6)

Vulvodynia is classified into subgroups according to the localization and manifestation of pain. The pain may be local (only in a limited area, such as the vestibulum or clitoris) or generalized (covering the entire vulvar area). Provoked pain requires contact or other stimuli to appear. Both local and generalized pain can be provoked or spontaneous, and there are mixed forms of both (7). Pure vestibular pain arising from pressure or even light touch (local provoked vulvodynia, LPV) which particularly affects young women aged 18–40 years, is the most studied form of vulvodynia. In primary LPV, contact pain exists immediately in the first vaginal opening penetration (tampon, intercourse), while secondary vulvodynia develops later in life. (7)

### 1.2.2 Localized provoked vestibulodynia (LPV)

In this subtype of vulvodynia (previously known as vulvar vestibulitis syndrome) touching the vestibule causes pain (8). The main symptom is painful intercourse. Pain is easy to locate with a cotton swab test. Typically, the cotton swab test causes an evasive response and shows sharp pain in the posterior vestibule at 5 and 7 o'clock, often in the paraurethral region in the anterior vestibule at 1 and 11 o'clock. (7) The posterior vestibule may show erythema at the points of pain that correspond to the location of the vestibular glands (Bartholin glands) of the vulva.

Since the slightest contact with the vulvar vestibule provokes pain (allodynia), a speculum examination, cotton swab test or bimanual palpation are difficult or impossible to perform. (7) Elevated tone of the pelvic floor muscles is often present in some patients with vulvodynia, but it is not requisite for a diagnosis (8).

### 1.2.3 Spontaneous vulvodynia

Pure spontaneous vulvodynia is clearly more often afflicted by the older age group. The pain is constant and may be felt all over the vulva, can radiate to the anus, lumbar spine or thighs, and does not usually cause dyspareunia. The pain worsens towards evening. This condition is also known as pudendal neuralgia or essential vulvodynia. (7)

### 1.2.4 Etiopathogenesis

The etiology of vulvodynia is unclear. Some studies have shown that initiated use of combined oral contraceptives (COC) at a young age poses up to 6-fold higher risk of developing vulvodynia compared with those not using COCs. A reduction in estrogen levels followed by thinning of the

vagina and vulvar mucosa is associated with the use of COC (9,10) The emergence of vulvodynia is most likely a combination of many different factors. Predisposing factors may include infections such as yeast infection or urinary tract infection, genetic, immunological and hormonal factors, increased urine oxalate secretion and proliferation of neurons and free nerve endings in the vulvar mucosa (3,5,8,10). It is not clear however whether the culprit is the yeast itself an underlying sensitivity present in the tissue, or symptoms of vulvodynia treated as yeast infections in the absence of a better understanding (11).

Patients with vulvodynia have more generalized pain conditions such as fibromyalgia, irritable bowel syndrome and interstitial cystitis than the general population. A study showed that women suffering from vulvodynia were 2-3 times more likely to develop one or more other chronic pain syndrome (11). This, according to researchers, may indicate a common pathophysiology. Women that are homozygous for allele 2 in the interleukin-1 $\beta$  receptor antagonist often have a prolonged inflammatory response. Susceptibility to vulvodynia might be influenced by carriage of this polymorphism (10).

Vulvodynia has been observed in some studies co-occurring with depression and anxiety. Patients often feel powerless as they do not understand their symptoms or how to alleviate them which leads to problems in intimate relationships. (12) Nearly 2000 women surveyed who met the criteria for depression had a 53% higher prevalence of vulvodynia. The prevalence of vulvodynia in women who met the criteria for a post-traumatic stress disorder was 2.4-fold higher compared with healthy controls (13). Those with vulvodynia were more likely to develop new depression or anxiety, or relapse with old diseases (14). Thus, it can be assumed that mental disorders increase a risk of developing vulvodynia and having vulvodynia increases the likelihood of developing mental disorders. However there is no support to the theory that mental problems are the main cause of vulvodynia, though a mutual risk profile for these diseases may exist (11).

### 1.3 Treatment options

Early diagnosis and treatment should be given in primary care by referring the patient to a specialist who is familiar with the matter. Explaining the anatomy by using a mirror and a drawing is extremely helpful. Treatment requires commitment and perseverance from the patient. In order for the treatment to be successful the treatment provider should ask about pain during sexual intercourse and how it has affected the intimate relationship or mood. In treatment, empathy and support are of utmost importance. Helping the patient and her partner to understand the situation and the varying nature of the symptoms can be very helpful. (15)



At present, there are not enough tools to completely correct disturbances in pain modulating pathways. Thus pain may persist to a greater or lesser extent, despite the removal of all factors related to the development, maintenance, or exacerbation of vulvodynia symptomatology.

### 1.3.1 Vulvar care measures

The patient is advised to wash intimate parts using cool water without soap. Basic cream can be used instead of soap. Rubbing the skin should be avoided and drying should be done by patting with a soft towel. Panty liners are not recommended for their non-breathability and menstrual padding should be changed often enough. The patient is advised to take air baths as often as possible and sleep without underwear. If shaving pubic hair causes irritation it should be kept as it allows for air circulation between underwear and skin. (16)

After washing, unscented basic cream or oil can be applied to the mucous membranes and painful areas of the vulva. The cream improves the condition of the mucous membranes and relieves pain symptoms. Lubricants or basic creams also prevent mucosal rupture during intercourse, when using a vibrator or enlarging or dilating the vagina with fingers or a dilatation stick. The material of underwear should be breathable natural materials, such as cotton, as dyes have allergenic effects. Clothing should not be tight and strings as well as tight pants should be avoided if they cause discomfort. (16)

### 1.3.2 Medical treatment

If the patient is using coc she is advised to first try a break of 3 to 6 months taking care of contraception in other ways. If yeast infections have occurred repeatedly, yeast prophylaxis is initiated. Other possible vaginal infections are also treated. Later treatment can involve anesthetics, gabapentin ointments, and corticosteroid injections or botox. Anesthetic gels should be used daily for several weeks. Oral tricyclic antidepressants can be used such as Amitriptyline. Other possible oral medications include Gabapentin or Pregabalin. Duration of treatment and the dosage of the drugs is always individual. (16,17)

### 1.3.3 Physical therapy

If an internal examination reveals or suspects excessive pelvic floor muscle tension, a referral to a physiotherapist is made. Exercising the pelvic floor muscles helps identify and differentiate the

difference between muscle tension and relaxation, which helps to manage pain in the vulvar area. Biofeedback is a helpful tool in learning to control both contracting and relaxing pelvic floor muscles. Treatment is continued with therapeutic exercises to achieve muscle balance as well as good posture.

In patients who do not show any pelvic floor muscle dysfunction biofeedback is useful. It makes them more aware of their innate anatomy and diminishes the fear of touching. Biofeedback therapy has been found to relieve body self-awareness and thus reduce physical pain and mental tension in situations with intercourse. (18) Physical therapy often includes the use of dilators and is “goal oriented” towards sexual intercourse. This can be problematic. Many women with fear, aversion and pain with penetration report sexual feelings, desire, arousal, and orgasm and overall satisfaction with nonpenetrative sexual activities (19).

#### 1.3.4 Psychosocial treatments

Difficulties in sexual communication and problems in a relationship may all contribute to exacerbating pain and associated sexual difficulties. Psychological approaches therefore aim to teach better communication skills and sexual repertoire. (20). Greater disclosure and empathic response may assist couples in navigating away from penetrative, painful intercourse and toward sexual activities that are more pleasurable, which is likely to reduce the emotional and functional interferences of vulvodynia, thus enhancing women’s quality of life (21,22).

#### 1.3.5 Surgery

If conservative treatment does not bring enough pain relief, a last option can be removing tissue from the painful area by surgery. During vestibulectomy the resulting tissue deficiency is replaced by mobilizing and attaching vaginal mucosa which is devoid of pain (23).

#### 1.3.6 A multidisciplinary approach

It is important to begin any treatment approach with a detailed discussion including an explanation of the diagnosis and determination of realistic treatment goals. Certain comorbidities (e.g., headache, irritable bowel syndrome, interstitial cystitis, fibromyalgia, back pain, and temporomandibular joint disorder) confound establishing a diagnosis of vulvodynia and should be considered when choosing treatment. (24)

Although optimal treatment remains unclear, an individualized, multidisciplinary approach should be offered to address all physical and emotional aspects to which the vulvodynia pain can be attributed. Multidisciplinary means involving pain specialists, physical therapists, clinical psychologists and sexual counselors. They work together as a team with the patient to get the best results (24) A realistic goal in the treatment of vulvodynia is reducing, managing and coping with the pain. Treatment may not result in complete disappearance.

## 2 Objectives

The purpose of this review is to appraise existing research data on the conservative treatment of vulvodynia with emphasis on mindfulness based cognitive therapy and cognitive behavioral therapy. Both are relatively new approaches and involve practice of specific pain-relevant coping and self-management skills. (25) Another aim of this review is to educate health care practitioners regarding treatment options, which manage the physical as well as psychosocial aspects of vulvodynia.

## 3 Material and Methods

The PubMed, Ovid Medline, PsychInfo, Google Scholar and CINAHL databases were used to obtain the research material to this literature review. The keywords used were: mindfulness AND cognitive behavioral therapy AND vulvodynia, mindfulness AND dyspareunia, mindfulness AND vaginismus, mindfulness AND vulvodynia, vulvodynia AND pain AND mindfulness, vulvodynia AND sexual therapy, vulvodynia AND sexual counseling, vulvodynia AND rehabilitation, genito-pelvic pain AND rehabilitation. A manual search from reference lists of included articles was performed. The main focus was on research conducted in the last 10 years, particularly relevant to the topic.

## 4 Results

This literature review encompasses conservative treatment of vulvodynia. The focus is on conservative management involving psychosexual aspects and effects of mindfulness based cognitive therapy (MCBT) and cognitive behavioral therapy (CBT).

#### 4.1 Psychological interventions

Psychological interventions focus on decreasing pain, restoring sexual function, and strengthening the romantic relationship by targeting the thoughts, emotions, behaviors, and couple interactions associated with the experience of genital pain. Such interventions can be delivered in individual, couple, or group formats (26,31).

Psychological treatments for vulvodynia have the advantage of targeting both the experience of pain and its many psychosexual consequences, such as reduced desire and arousal. CBT currently represents one of the most popular first-line psychological interventions for vulvodynia. Mindfulness has been increasingly used alongside, or instead of CBT for a variety of health-related conditions, particularly with respect to chronic pain disorders and more recently in women with vulvodynia (27,28) Co

#### 4.2 Cognitive behavioral therapy

CBT is aimed at challenging maladaptive pain related thoughts, teaching relaxation skills, targeting avoidance behavior, and restoring sexual function. Randomized controlled studies have shown that CBT compared to supportive psychotherapy (SPT) (29) and corticosteroids (30) delivered in individual or group format results in greater improvements in pain and sexual function that are maintained up to 1 year later. A randomized trial by Masheb et al in 2004 studied the efficacy of CBT and SPT in 50 women of those diagnosed with vulvodynia. Of the 50 participants, 42 (84%) completed 10-week treatments and 47 (94%) completed one-year follow-up assessments. In the CBT intervention participants were taught self-management skills that alter thoughts, feelings and behaviors. The treatment involved three overlapping phases: orientation to a self-management approach, skills acquisition, and skills practice. SPT followed a patient-centered approach. Therapists were trained to assist participants in expressing their feelings while not making specific suggestions for how the person might wish to change. The therapist's role was 1) to have a positive, accepting attitude toward whatever state of mind the patient was at that moment), 2) to engage in empathic understanding and 3) to mirror (a technique of communicating this understanding back to the patient thus helping them to explore and understand their feelings for themselves. (29)

Participants had statistically significant decreases in pain severity ( $p$ 's $<0.001$ ) with 42% of the overall sample achieving clinical improvement. CBT, relative to SPT, resulted in significantly greater improvement in pain severity during physician examination ( $p=0.014$ ), and greater improvement in sexual function ( $p=0.034$ ), from pre- to post-treatment. Treatment effects were well maintained at one-year follow-up in both groups. Participants in the CBT intervention reported significantly greater treatment improvement, satisfaction and credibility than participants in the SPT intervention ( $p$ 's $<0.05$ ). (29)

A 13-week randomized clinical trial by Bergeron et al aimed to compare group cognitive-behavioral therapy (GCBT) and a topical steroid in the treatment of provoked vulvodynia. Participants were 97 women randomly assigned to either one of the treatment interventions. They were assessed at pretreatment, posttreatment and 6-month follow-up via structured interviews and standard questionnaires pertaining to pain (McGill Pain Questionnaire, 11-point numerical rating scale of pain during intercourse), sexual function (Female Sexual Function Index, intercourse frequency), psychological adjustment (Pain Catastrophizing Scale, Painful Intercourse Self-Efficacy Scale), treatment satisfaction, and participant global ratings of improvements in pain and sexuality. The topical corticosteroid treatment aimed to reduce presumed inflammation in vulvodynia involving three components: (a) a twice daily application of 1% hydrocortisone cream (Cortate 1%) for 13 weeks; (b) written education materials about vulvodynia and its day to day management, such as using cotton underwear and mild soap; and (c) the instruction to use a water-based lubricant for intercourse. (25)

GCBT was delivered in a university hospital by a clinical psychologist, in 2-hr group sessions with seven to eight women per group. Participants received 10 sessions over a 13-week period. The treatment package included the following: education and information about vulvodynia and how dyspareunia impacts on desire and arousal, education concerning a multifactorial view of pain, education about sexual anatomy, progressive muscle relaxation, abdominal breathing, Kegel exercises, vaginal dilation, distraction techniques focusing on sexual imagery, rehearsal of coping self-statements, communication skills training, and cognitive restructuring.

Both treatment groups reported statistically significant reductions in pain from baseline to posttreatment and 6-month follow-up, although the GCBT group showed significantly more pain reduction at 6-month follow-up on the McGill Pain Questionnaire. Both groups significantly improved on measures of psychological adjustment, and the GCBT group had significantly greater

reductions in pain catastrophizing at posttreatment. Both groups' sexual function significantly improved from baseline to posttreatment and 6-month follow-up, but the GCBT group was doing significantly better at the 6-month follow-up. Treatment satisfaction was significantly higher in the GCBT group, as were self-reported improvements in pain and sexuality. (25)

A clinical trial for women with vulvodynia by Spoelstra and colleagues compared psychotherapy, biofeedback and vestibulectomy. All participants (N=64) underwent a gynecological examination, received information about vulvodynia (course and treatment options) as well as vaginal EMG biofeedback together with pelvic floor physiotherapy. 27 women (42%) also received psychotherapy and 15 women (23%) underwent surgery. Mean duration of treatment was 148 weeks. Three to seven years after treatment women completed retrospective questionnaires. The women reported less vulvar pain but feelings of sexual distress remained. Comparison of the mean pretreatment and post-treatment VAS scores showed a significant reduction in vulvar pain. Pain reduction was reported by 52 women (81%), whereas no change and pain increase were reported by 7 women (11%) and 5 women (8%), respectively. Post-treatment, 80% of the women had resumed intercourse. Only 5 women (8%) reported completely pain-free intercourse. Comparisons with age-related FSFI and FSDS (female sexual distress scale) Dutch norm data showed that scores for sexual functioning in the study group were significantly lower, while scores for sexually related personal distress were significantly higher. There were no significant differences in relational sexual satisfaction ratings between the study group and the NRV (Dutch relationship questionnaire) Dutch norm data. (32)

CBT in a group setting was incorporated into a study by Sadownik et al as part of a multidisciplinary vulvodynia program. After 2 educational seminars, 46 women participated in three 90-minute group cognitive behavioral therapy (gCBT) sessions with a clinical psychologist. These sessions were aimed at introducing, practicing, and refining skills in cognitive challenging, and clarifying the role of thoughts, emotions, and actions in genital pain. Behavioral exercises in mindfulness, diaphragmatic breathing, and progressive muscle relaxation were practiced in the sessions and recommended for homework between sessions. The program also used physical therapy (biofeedback) and medical management. This qualitative study lacked randomization or a control group, but demonstrated that a multidisciplinary vulvodynia program increased knowledge/skills, resulted in perceived improved mood/psychological well-being, a sense of validation and support, and an enhanced sense of empowerment (33).

Corsini-Munt and colleagues conducted a study with Cognitive-behavioral couple therapy (CBCT). The CBCT intervention was delivered as 12 one-hour sessions which included elements of Acceptance and Commitment Therapy (ACT), with an emphasis on engaging both partners, reducing experiential and behavioral avoidance and identifying relevant relational patterns of the couple. Participants were 9 couples coping with vulvodynia (15). The primary outcome measure was women's pain intensity during intercourse using a numerical rating scale. Secondary outcomes included sexual functioning and satisfaction for both partners. The study showed significant improvements in sexuality and pain outcomes. The treatment also resulted in better psychological functioning for the couples compared to pretreatment. This suggests that the inclusion of the partner in the treatment of vulvodynia appears beneficial. (15)

In 2006 Kuile et al recruited 76 vulvodynia patients at a sexology outpatient clinic of a department of gynecology at a university hospital. The women took part in a cognitive-behavioral group program that consisted of the following: education about pain in relation to anxiety, information about muscle contraction as a consequence of pain and fear of pain, and information about sexuality. More specific information was provided about how pain, or the thought of it, as a consequence of vulvodynia can affect sexual arousal and lubrication and sexual desire in general. Training was provided in coping, self-statements, and cognitive restructuring. The following exercises were used: progressive muscle relaxation, suggestive relaxation, suggestive pain transformation and analgesia, abdominal breathing, touching and vaginal dilatation by insertion of one and two fingers by the woman herself and later on by the partner, and sexual imagery. After treatment, patients reported less pain with vaginal intercourse, less sexual dissatisfaction, and experienced more pain control. Physical examinations also revealed fewer red painful spots on the vestibule and less vaginal muscle tension. Patients were asked to rate the intensity of pain during intercourse on a scale of 0 to 10. At posttreatment they reported significantly lower levels of pain during intercourse. Pre mean scores were 8.0 and post mean scores 6.8. (34)

A controlled study found CBT to be as effective as pelvic floor physiotherapy both in the short term and in the long term (35). Twenty women with vulvodynia were randomly assigned to eight sessions of either individual cognitive-behavioral therapy (ICBT) or pelvic floor rehabilitation (PFR). Participants were assessed at pre-treatment, post-treatment, and 6-month follow-up via gynecological

examination, structured interviews and standardized questionnaires measuring pain, psychological, and sexual variables, quantitative sensory testing, and a pelvic floor muscle (PFM) evaluation. The primary outcome was change in intercourse pain intensity. Secondary outcomes included changes in other features of vestibular pain (e.g., frequency), cotton-swab test pain intensity, vestibular sensitivity, sexual functioning, PFM functioning, and pain cognitions. Results indicated no differences in the effectiveness of the treatment groups with respect to pain outcomes, with both groups demonstrating significant reductions in pain. (35)

#### 4.2.1 Mindfulness for chronic pain

Gaylord and colleagues explored the feasibility and efficacy of a group program of mindfulness training for women with irritable bowel syndrome (IBS). The technique involved training in intentionally attending to present-moment experience and non-judgmental awareness of body sensations and emotions. Seventy-five female IBS patients were randomly assigned to eight weekly and one half-day intensive sessions of either mindfulness group (MG) training or a support group (SG). Participants completed the IBS severity scale (primary outcome), IBS-quality of life, brief symptom inventory-18, visceral sensitivity index, treatment credibility scale, and five-facet mindfulness questionnaire before and after treatment and at 3-month follow-up. (37) Women in the MG showed greater reductions in IBS symptom severity immediately after training (26.4% vs. 6.2% reduction;  $P=0.006$ ) and at 3-month follow-up (38.2% vs. 11.8%;  $P=0.001$ ) relative to SG. Changes in quality of life, psychological distress, and visceral anxiety were not significantly different between groups immediately after treatment, but there were significantly greater improvements in the MG than in the SG at the 3-month follow-up. Mindfulness scores increased significantly more in the MG after treatment, confirming effective learning of mindfulness skills. Participants' ratings of the credibility of their assigned interventions, measured after the first group session, were not different between groups. (36)

A quasi-experimental study examined effects of an 8-week MCBT intervention among 58 female patients with fibromyalgia (mean, 52 +/- 8 years). They underwent MCBT or an active social support procedure. Participants were assigned to groups by date of entry, and 6 subjects dropped out during the study. Self-report measures were validated German inventories and included the following scales: visual analog pain, pain perception, coping with pain, a symptom checklist and quality of life (QoL).



Pre- and postintervention measurements were made. Additionally, a 3-year follow-up was carried out on a subgroup of 26 participants. Pre- to postintervention analyses indicated MCBT to provide significantly greater benefits than the control intervention on most dimensions, including visual analog pain, QoL subscales, coping with pain, anxiety, depression and somatic complaints. Three-year follow-up analyses of MBSR participants indicated sustained benefits for these same measures (effect size, 0.50-0.65). (37)

Bhasin et al studied the effects of invoking the relaxation response (RR, the counterpart of the stress response) with mindfulness practices over an eight week period. The study involved enrolling 26 healthy subjects who had no prior RR-eliciting experience (Novices, N1) which served as their own controls. They then underwent 8 weeks of RR-eliciting training (Short-term Practitioners, N2). The cross-sectional aspect of the study involved enrolling another 26 healthy subjects who had significant prior experience of regular RR-eliciting practice for 4–20 years (Long-Term Practitioners, M) to be compared with novices either before or after their 8-week training. RR practice enhanced expression of genes associated with energy metabolism, mitochondrial function, insulin secretion and telomere maintenance, and reduced expression of genes linked to inflammatory response and stress-related pathways (38).

To better understand how mindfulness meditation influences the sensory experience Zeidan and colleagues used arterial spin labeling functional magnetic resonance imaging to assess the neural mechanisms by which mindfulness meditation influences pain in healthy human participants. Mindfulness-based mental training was performed in four separate, 20 min sessions conducted by a facilitator with >10 years of experience in leading similar meditation regimens. Subjects had no previous meditative experience. After 4 days of mindfulness meditation training, meditating in the presence of noxious stimulation significantly reduced pain unpleasantness by 57% and pain intensity ratings by 40% when compared to a resting state without mindfulness meditation. A two-factor repeated-measures ANOVA was used to identify interactions between meditation and pain-related brain activation. Meditation reduced pain-related activation of the contralateral primary somatosensory cortex. Multiple regression analysis was used to identify brain regions associated with individual differences in the magnitude of meditation-related pain reductions. Meditation-induced reductions in pain intensity ratings were associated with increased activity in the anterior cingulate cortex and anterior insula, areas involved in the cognitive regulation of nociceptive processing. (39)

#### 4.2.2 Mindfulness-based cognitive behavioral therapy

Mindfulness-based cognitive behavioral therapy aims to increase awareness of pain-related thoughts and learning to accept them without judgment (40). Through mindfulness one can identify a thought as being problematic. With that awareness the problematic thought can be challenged through the use of CBT. Focused attention and acceptance of all sensations is fundamental to the skill of mindfulness, and acceptance is a central concept to coping with any chronic pain condition.

A study by Brotto and colleagues analyzed both quantitative and qualitative outcomes after a 4-session mindfulness-based group cognitive therapy for women with vulvodynia versus treatment waitlist controls. A desired outcome of treatment was to increase sexual pleasure, arousal, and satisfaction—parameters that have shown benefit from both mindfulness practice and CBT (40). The practice of noticing distracting thoughts but not following them during a meditation is noted to be especially helpful for women's sexual experience as distractions are a common cause of inhibition in sexual arousal. Cultivating mindfulness can lessen self-judgment and enhance the ability to focus on erotic thoughts. They found significant improvements in pain, pain catastrophizing, mood, and sex-related distress but any improvement in dyspareunia. The authors conclude that while changes in dyspareunia were not detected it could be due to the fact that few women engaged in penetrative sex within the time frame examined. (40)

In another study by Brotto et al outcomes of MBCT and CBT were studied. Participants were 130 women diagnosed with vulvodynia who had participated in a clinical trial comparing 8 weeks of group CBT to 8 weeks of group MBCT. Data were collected at pretreatment, posttreatment, and at 6- and 12-month follow-up periods. Outcomes focused on pain with vaginal penetration, pain elicited with a vulvalgesiometer and sex-related distress. The vulvalgesiometer is a device to measure genital pressure-pain threshold. Outcomes of interest included pain acceptance (both pain willingness and activities engagement), self-compassion, self-criticism, mindfulness, decentering, and pain catastrophizing. They observed improvements in all 3 outcomes and improvements retained at 12-month follow-up, with no group differences. Pain catastrophizing, decentering, and chronic pain acceptance were mediators of improvement common to both MCBT and CBT. Changes in mindfulness, self-criticism, and self-compassion mediated improvements only in the MBCT group. (41)

In a randomized controlled trial Guillet et al compared the effectiveness of mindfulness-based group cognitive behavior therapy (M-gCBT) with education support group therapy for the pain and distress associated with vulvodynia. Of thirtyone participants 14 were randomized to M-gCBT and 17 to education support. Baseline characteristics did not differ significantly. Vaginal insertion pain decreased in both groups but there was no statistically significant difference between groups (difference of 1.23; 95% CI = -0.52 to 2.98). At 6 months, the M-gCBT group showed statistically significant greater improvements in the Female Sexual Function Index, Generalized Anxiety Disorder 7, and Beck's Depression Index compared with the education support group. (42)

Based on a review of 137 articles in the fields of pain, gynecology, mindfulness, CBT, stress response and brain imaging Basson created a model which reflects how stress-induced changes of pain amplification may impair sexual response and create sexual dysfunction. In figure 3 it is illustrated that emotional distress is associated with anxiety, depression, traits of catastrophization, harm avoidance, hypervigilance, self-dislike and perfectionism. All of which are associated with neuroplastic changes in the central nervous system leading to central sensitization and pain amplification. Feelings of being sexually substandard lessen sexual motivation and response. Pain-induced cognitive changes may impair processing of sexual stimuli generally and at the time of sexual activity. Motivational changes associated with chronic pain circuitry may further impair sexual motivation. Functional brain changes associated with MCBT seems to be promising to target both the pain and sexual suffering from vulvodynia. (43)

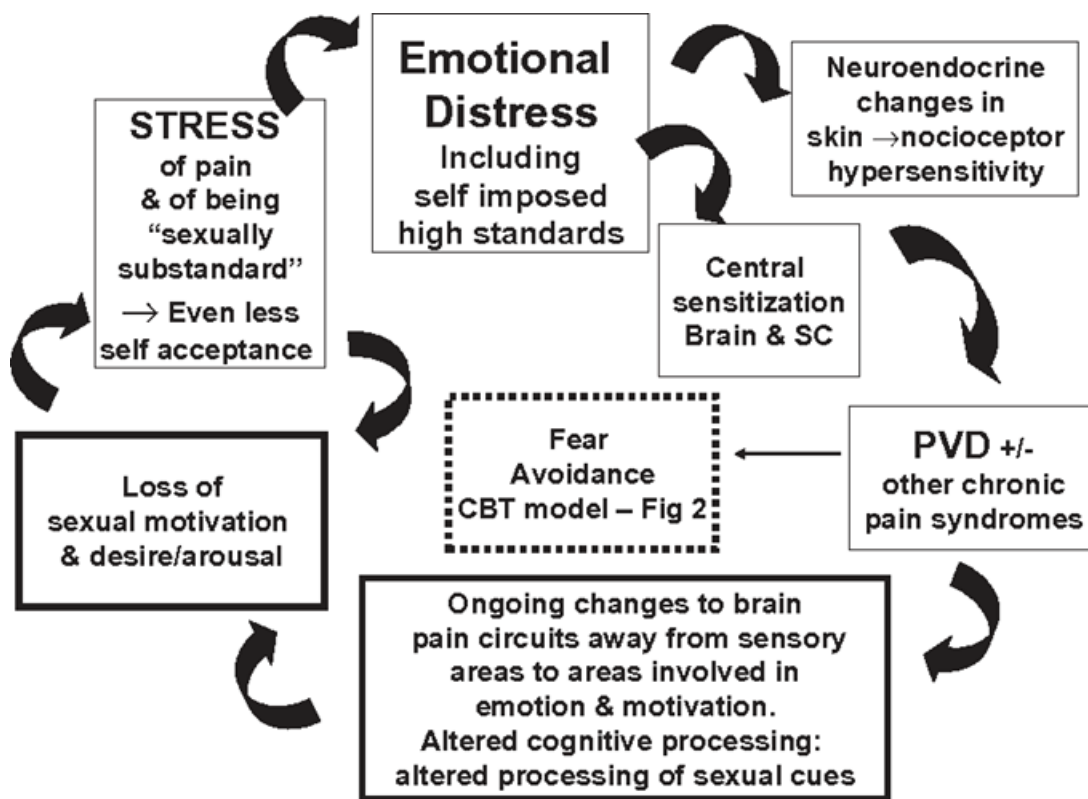


Figure 3 Circular model of vulvodynia to illustrate the compounding effects of subsequent sexual dysfunction on overall stress load by Basson 2012. (43)

*Table 1 An Outline of Research Studies That Have Examined MCBT (page 21) and CBT (page 22) as treatments for vulvodynia*

<b>Intervention</b>	<b>Study type N</b>	<b>Comparison</b>	<b>Main outcome measures</b>	<b>F/U time</b>	<b>Effect</b>	<b>Year of publication, reference</b>
MCBT	RCT, 14+17	Education support	Vaginal insertion pain	6m	Vaginal insertion pain decreased in both groups	2019 (42)
Mindfulness-based psychoeducation	Follow up study, 26	-	Sexual response, sexual distress, mood, relationship satisfaction	-	Self reported sexual desire and distress all improved	2008 (31)
Individualized approach including vaginal EMG biofeedback combined with pelvic floor physiotherapy, CBT, and in some cases vestibulectomy	Retrospective study, 64	Healthy controls	VAS, FSFI, NRV	5y	Vulvar pain reduction following individualized, multifaceted treatment was reported by 81% of the women; 11% reported no change, and 8% reported increase in pain	2011 (32)
MCBT	Follow up study 62+23	Wait-list controls	Dyspareunia, FSFI	6m	Pain catastrophizing, self-efficacy, genital pain induced by a cotton swab test, pain hypervigilance, and sex-related distress all improved with mindfulness training and education. There was no change in pain with intercourse.	2015 (40)
MCBT	Follow up study 63+67	CBT	Dyspareunia	6m	Improved sexual function in both groups, MCBT superior to CBT regarding pain with vaginal intercourse	2019 (41)
Multidisciplinary MCBT	19	-	Psychological distress, sexual and relationship problems	-	Enhanced skill set for coping with vulvodynia. Sense of validation, support, and empowerment	2012 (33)

MCBT= Mindfulness based cognitive behavioral therapy RCT= Randomized controlled trial VAS= Visual analogue scale (measure of pain) FSFI= Female Sexual Function Index, NRV= Dutch Relationship Questionnaire IMPROVED=Integrated Mindfulness for Provoked Vestibulodynia CBT= Cognitive Behavioral Therapy EMG= Electromyography

Intervention	Study type N	Comparison	Main outcome measures	F/U time	Effect	Year of publication ref
CBT	RCT, 20	Physical therapy	Dyspareunia	6m	Significant reduction in intercourse pain	2013 (35)
CBT	RCT, 97 (46+51)	Topical application (corticosteroid analgesic cream)	Dyspareunia, VAS, FSFI	6m	CBT group reported significantly more improvements in pain and sexual functioning	2010 (30)
CBT	Prospective, 76	-	Dyspareunia	3m	Improved sexual satisfaction and reduction in pain with intercourse	2006 (34)
CBT	RCT, 81+36	waitlist-control	Full vaginal penetration	12m	Increase in frequency of intercourse and a decrease in fear of coitus	2007 (50)
CBT	RCT, 25+25	Supportive psychotherapy	Dyspareunia, FSFI	12m	Reduction in pain in both groups. Significant improvements in sexual function in the CBT group	2009 (29)

MCBT= Mindfulness based cognitive therapy RCT= Randomized controlled trial VAS= Visual analogue scale (measure of pain) FSFI= Female Sexual Function Index, NRV= Dutch Relationship Questionnaire IMPROVED=Integrated Mindfulness for Provoked Vestibulodynia CBT= Cognitive Behavioral Therapy EMG= Electromyography

## 5 Discussion

Current opinion suggests a multimodal approach to the treatment of vulvodynia. Treatment should be individualized to patients' needs and typically includes elements of psychosocial treatments, physical therapy, and pharmacological therapy such as oral and topical medications (44,45). Surgery by posterior vestibulectomy is a safe and effective treatment option for patients with an inadequate response to conservative management (24,27,32,47).

Mindfulness and cognitive behavioral therapy are both promising treatment approaches in the treatment of chronic pain. Vulvodynia is a multifaceted disorder and its treatment should address psychosocial aspects of healing rather than solely focusing on physical pain (46). CBT and mindfulness therapies are noninvasive, efficacious at long term, and provide a comprehensive biopsychosocial approach. Current research suggests these modalities are appropriate as first-line treatment options also for vulvodynia. (47)

A review by Goldstein et al demonstrated that many treatments for vulvodynia reduce but do not eliminate women's vulvovaginal pain and associated sexual impairment (26). Corsini and colleagues emphasize that while vulvodynia interventions are evaluated according to the capacity to reduce women's pain, which is the predominant symptom of vulvodynia, other important aspects of impairment (eg, psychological and sexual well-being) are not evaluated. It is particularly important for clinicians to reinforce alternative treatment outcomes and avoid using vaginal penetration as the only metric for treatment success. Psychological approaches (eg, CBT, MCBT) for women experiencing vulvodynia often recommend focusing on treatment outcomes independently of pain ratings and the ability to complete vaginal penetration, such as enhancing sexual pleasure, satisfaction, couple intimacy, and increasing pain self-efficacy. (20)

Capturing the multidimensional aspects (eg, focusing on multiple measures of the pain experience) should always be included in the management of vulvodynia. Improving functional capacity and reducing symptom related distress are essential markers of treatment success. (48) IMMPACT (Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials) guidelines on

vulvodynia urge researchers to consider quality of life, emotional function and sexual wellbeing as core measurement domains in clinical trials for vulvodynia (49). Corsini and colleagues suggest further potentially important markers of treatment success such as including reductions in sexual distress and fear-avoidance variables (eg, fear of pain, pain catastrophizing, pain hypervigilance), as well as increases in pain self-efficacy and pain acceptance. Therefore, while pain and sexual function remain the primary presenting problems that treatments aim to address they encourage researchers to assess additional outcomes. Those may meaningfully capture the degree of improvement experienced by women undergoing treatment for vulvodynia. By doing this, researchers could enhance knowledge of novel treatment targets for clinicians, and thus may promote symptom adaptation in addition to symptom management (20).

Most studies do not distinguish among the various forms of vulvodynia (27) and there is a great degree of variability in the length of follow up (33). Although some prospective studies have shown trends toward efficacy, there are noted limitations, including lack of consistent randomization and placebo controls, as well as small sample sizes (48). Despite encouraging results with a mindfulness and cognitive behavioral approach to treatment of vulvodynia, some of the MBCT studies in this review contend with methodological concerns such as small sample sizes low power, retrospective designs, and a lack of randomization or control groups. This confounds treatment effects with potential placebo responses. There is a need for further research on the etiology of vulvodynia and the mechanisms of therapeutic change that underlie the MBCT and CBT approach for treating vulvodynia. (20)

From a clinical perspective, findings suggest that psychological factors may play a significant role in the outcome of topical and CBT treatments for vulvodynia. Assessing psychological factors prior to beginning of treatment in order to tailor interventions according to a patients' different clinical profiles is important. Choosing the most relevant treatment option based on specific patient characteristics using simple and timeless tools also promotes treatment efficacy and reduces cost. (28) Brotto et al conclude that medical treatment outcomes could be improved by complementing these modalities with psychological interventions to help women with vulvodynia reduce their avoidance and regain a sense of efficacy over their pain and their sexuality. (41)



Sadownik and colleagues highlight that both primary care physicians and specialists can play a key role in diminishing a woman's suffering by improving their knowledge of and ability to diagnose vulvodynia. Providing accurate information about this condition, and making timely referrals to experienced treatment providers is important. Early diagnosis can substantially diminish the adverse effects of vulvodynia upon a woman and her sexual partner (33). There is a great need for more RCTs in order to provide further evidence-based treatment options to patients and their partners (50). Despite the high prevalence, only 60% of affected women seek treatment and only about 50% of those women receive a formal diagnosis of vulvodynia (51). Efforts need to be made to access those who do not seek help and are not involved with the healthcare system. Health care practitioners are encouraged to refer their patients to experienced CBT and mindfulness providers unless they have completed formal education and training themselves.

## References

- (1) Ross, M. H., & Pawlina, W. (2006). *Histology: A text and atlas : with correlated cell and molecular biology*. Baltimore, MD: Lippincott Williams & Wilkins.
- (2) Drake, Richard L., Wayne Vogl, Adam W. M. Mitchell, and Henry Gray. 2005. *Gray's anatomy for students*. Philadelphia: Elsevier/Churchill Livingstone.
- (3) Goldstein, P, Pukall CF. (2009.) *Female Sexual Pain Disorders*, pp.43 – 48. DOI: 10.1002/9781444308136.ch8
- (4) Bornstein J, Goldstein AT, Stockdale CK, et al. 2015 ISSVD, ISSWSH, and IPPS Consensus Terminology and Classification of Persistent Vulvar Pain and Vulvodynia. *J Sex Med*. 2016;13(4):607-612. doi:10.1016/j.jsxm.2016.02.167
- (5) Paavonen J. Vulvodynia. *Suom Lääkäril* 2013; 68: 487-90.
- (6) Nappi RE, Biglia N, Cagnacci A, Di Carlo C, Luisi S, Paoletti AM. Diagnosis and management of symptoms associated with vulvovaginal atrophy: expert opinion on behalf of the Italian VVA study group. *Gynecol Endocrinol*. 2016;32(8):602-606. doi:10.1080/09513590.2016.1183627
- (7) Jakobsson M, Nieminen P. (2019). *Vulvodynia. Lääkärin käsikirja*. Helsinki: Kustannus Oy Duodecim, 2020 [updated 23.04.2019]. <http://www.terveysportti.fi>. Read 20.05.2020.
- (8) Tommola P. Etiopathogenesis and treatment of localized provoked vulvodynia. Helsinki: [P. Tommola], 2017; 56.
- (9) Bouchard C, Brisson J, Fortier M, ym. Use of Oral Contraceptive Pills and Vulvar Vestibulitis: A Case-Control Study. *Am J Epidemiol* 2002;156:254-61.
- (10) Groysman V. Vulvodynia: New Concepts and Review of the Literature. *Dermatol Clin* 2010;28:681-96
- (11) Reed BD, Harlow SD, Sen A, ym. Relationship Between Vulvodynia and Chronic Comorbid Pain Conditions. *Obstet Gynecol* 2012;120:145-51.

- (12) Törnävä M., Koivula M. & Suominen T. (2013) Naisten kokemuksia vulvodynian vaikutuksesta parisuhteeseen. *Hoitotiede* 25, 241–252.
- (13) Iglesias-Rios L, Harlow SD, Reed BD. Depression and posttraumatic stress disorder among women with vulvodynia: evidence from the population-based woman to woman health study. *J Womens Health* 2015;24:557-62
- (14) Khandker M, Brady SS, Vitonis AF, ym. The influence of depression and anxiety on risk of adult onset vulvodynia. *J Womens Health* 2011;20:1445-51.
- (15) Corsini-Munt S, Bergeron S, Rosen NO, Mayrand MH, Delisle I. Feasibility and preliminary effectiveness of a novel cognitive-behavioral couple therapy for provoked vestibulodynia: a pilot study. *J Sex Med.* 2014;11(10):2515-2527. doi:10.1111/jsm.12646
- (16) Heinonen, P. 2015: Vulvodynian ja vaginismien hoito seksuaaliterapian keinoin. Sexpo-säätiö. Seksuaaliterapiakoulutus. Lopputyö.
- (17) Heinonen, P, Kero K. Vertaistuki ja asiantuntija-apu vulvodyniapotilaiden hoidossa. *Lääketieteellinen aikakauskirja Duodecim* 2020;136(2):147-54.
- (18) Törnävä, M. Vastaanotolla vulvodyniaa sairastava nainen: koulutusinterventiotutkimus vulvodynian ja sen hoidon tietämyksestä terveydenhuoltohenkilöstöllä. 2017. University of Tampere; Tampere University Press.
- (19) Rosenbaum TY. An integrated mindfulness-based approach to the treatment of women with sexual pain and anxiety: promoting autonomy and mind/body connection. *Sexual & Relationship Therapy* [Internet]. 2013 Feb [cited 2020 Jun 10];28(1/2):20–8. Available from: <http://search.ebscohost.com.libproxy.helsinki.fi/login.aspx?direct=true&db=cin20&AN=104267235&site=ehost-live&scope=site>
- (20) Corsini-Munt S, Rancourt KM, Dubé JP, Rossi MA, Rosen NO. Vulvodynia: a consideration of clinical and methodological research challenges and recommended solutions. *J Pain Res.* 2017;10:2425-2436. Published 2017 Oct 9. doi:10.2147/JPR.S126259
- (21) Rosen, N.O., Bois, K., Mayrand, M. et al. Observed and Perceived Disclosure and Empathy Are Associated With Better Relationship Adjustment and Quality of Life in Couples Coping With Vulvodynia. *Arch Sex Behav* 45, 1945–1956 (2016). <https://doi-org.libproxy.helsinki.fi/10.1007/s10508-016-0739-x>

- (22) Benoit-Piau J., Bergeron S., Brassard A., Dumoulin C., Khalife S., Waddell G., Morin M. (2018). Fear-avoidance and pelvic floor muscle function are associated with pain intensity in women with vulvodynia. *The Clinical Journal of Pain*, 34, 804-810.
- (23) Tommola P. Ulkosynnyttimien kiputilat. *Duodecim* 2018; 134: 927-35.
- (24) Sadownik L. A. (2014). Etiology, diagnosis, and clinical management of vulvodynia. *International journal of women's health*, 6, 437-449. <https://doi.org/10.2147/IJWH.S37660>
- (25) Bergeron S, Khalifé S, Dupuis MJ, McDuff P. A randomized clinical trial comparing group cognitive-behavioral therapy and a topical steroid for women with dyspareunia. *J Consult Clin Psychol*. 2016;84:259-268.
- (26) Goldstein AT, Pukall CF, Brown C, Bergeron S, Stein A, Kellogg-Spadt S. Vulvodynia: Assessment and Treatment. *J Sex Med*. 2016;13(4):572-590. doi:10.1016/j.jsxm.2016.01.020
- (27) Dunkley, C.R., Brotto, L.A., 2016. Psychological Treatments for Provoked Vestibulodynia: Integration of Mindfulness-Based and Cognitive Behavioral Therapies. *Journal of Clinical Psychology*.. doi:10.1002/jclp.22286
- (28) Segal ZV, Williams JMG, Teasdale JD. 2013. *Mindfulness Based Cognitive Therapy for Depression*. New York: Guilford Press.
- (29) Masheb, R. M., Kerns, R. D., Lozano, C., Minkin, M. J., & Richman, S. (2009). A randomized clinical trial for women with vulvodynia: Cognitive-behavioral therapy vs. supportive psychotherapy. *Pain*, 141(1-2), 31-40. <https://doi.org/10.1016/j.pain.2008.09.031>
- (30) Desrochers, G., Bergeron, S., Khalifé, S., Dupuis, M.-J., Jodoin, M., 2010. Provoked vestibulodynia: Psychological predictors of topical and cognitive-behavioral treatment outcome. *Behaviour Research and Therapy*.. doi:10.1016/j.brat.2009.09.014
- (31) Brotto LA, Basson R, Luria M. A mindfulness-based group psychoeducational intervention targeting sexual arousal disorder in women. *J Sex Med*. 2008 Jul;5(7):1646-59. doi: 10.1111/j.1743-6109.2008.00850.x. PMID: 18507718.

- (32) Spoelstra SK, Dijkstra JR, van Driel MF, Weijmar Schultz WC. Long-term results of an individualized, multifaceted, and multidisciplinary therapeutic approach to provoked vestibulodynia. *J Sex Med.* 2011;8(2):489-496. doi:10.1111/j.1743-6109.2010.01941
- (33) Sadownik LA, Seal BN, Brotto LA. Provoked vestibulodynia-women's experience of participating in a multidisciplinary vulvodynia program. *J Sex Med.* 2012 Apr;9(4):1086-93. doi: 10.1111/j.1743-6109.2011.02641.x. Epub 2012 Feb 21. PMID: 22353181.
- (34) ter Kuile, M. M., & Weijnenborg, P. T. M. (2006). A cognitive-behavioral group program for women with vulvar vestibulitis syndrome (VVS): Factors associated with treatment success. *Journal of Sex and Marital Therapy*, 32(3), 199–213
- (35) Goldfinger, CA. (2013) A randomized comparison of individual cognitive-behavioural therapy and pelvic floor rehabilitation in the treatment of provoked vestibulodynia. Queen's Graduate Theses and Dissertations. Department of Psychology Graduate Theses. <http://hdl.handle.net/1974/8472>
- (36) Gaylord SA, Palsson OS, Garland EL, et al. Mindfulness training reduces the severity of irritable bowel syndrome in women: results of a randomized controlled trial. *Am J Gastroenterol.* 2011;106:1678–88.67.
- (37) Grossman P, Tiefenthaler-Gilmer U, Raysz A, Kesper U. Mindfulness training as an intervention for fibromyalgia: evidence of post intervention and 3-year follow-up benefits in well-being. *Psychother Psychosom.* 2007;76:226–33
- (38) Bhasin MK, Dusek JA, Chang BH, et al. Relaxation response induces temporal transcriptome changes in energy metabolism, insulin secretion and inflammatory pathways. *Plos One.* 2013;8(5):e62817
- (39) Zeidan F, Martucci KT, Kraft RA, et al. Brain mechanisms supporting the modulation of pain by mindfulness meditation. *J Neurosci.* 2011;31(14):5540–8.
- (40) Brotto LA, Basson R, Smith KB, Driscoll M, Sadownik L. Mindfulness-based group therapy for women with provoked vestibulodynia. *Mind* 2015;6:417–32
- (41) Brotto, L, Bergeron S, Zdaniuk B, Basson R. Mindfulness and Cognitive Behavior Therapy for Provoked Vestibulodynia: Mediators of Treatment Outcome and Long-Term Effects. *J Consult Clin Psychol.* 2020;88(1):48-64. doi:10.1037/ccp0000473.

- (42) Guillet AD, Cirino NH, Hart KD, Leclair CM. Mindfulness-Based Group Cognitive Behavior Therapy for Provoked Localized Vulvodynia: A Randomized Controlled Trial. *J Low Genit Tract Dis*. 2019;23(2):170-175. doi:10.1097/LGT.0000000000000456
- (43) Basson R. The recurrent pain and sexual sequelae of provoked vestibulodynia: a perpetuating cycle. *J Sex Med*. 2012;9(8):2077-2092. doi:10.1111/j.1743-6109.2012.02803.x
- (44) Craven MK, Thelen RL, Elliott L, Lazear J. Provoked Vulvodynia: A Holistic Treatment Approach. *Journal for Nurse Practitioners* [Internet]. 2016 Sep [cited 2020 Jun 10];12(8):530–5. <http://search.ebscohost.com.libproxy.helsinki.fi/login.aspx?direct=true&db=cin20&AN=126065679&site=ehost-live&scope=site>
- (45) Broderick JE, Keefe FJ, Schneider S, et al. Cognitive behavioral therapy for chronic pain is effective, but for whom? *Pain*. 2016;157:2115–2123.
- (46) Loflin BJ, Westmoreland K, Williams NT. Vulvodynia: A Review of the Literature. *Journal of Pharmacy Technology* [Internet]. 2019 Feb [cited 2020 Jun 11];35(1):11–24. Available from: <http://search.ebscohost.com.libproxy.helsinki.fi/login.aspx?direct=true&db=cin20&AN=133860415&site=ehost-live&scope=site>
- (47) Bergeron S, Reed BD, Wessermann U, Bohm-Starke N. Vulvodynia. *Nat Rev Dis Primers*. 2020;6(1):36. Published 2020 Apr 30. doi:10.1038/s41572-020-0164-2
- (48) Pukall CF, Bergeron S, Brown C, Bachmann G, Wessermann U. Recommendations for self-report outcome measures in vulvodynia clinical trials. *Clin J Pain*. 2017;33:756–765.
- (49) De Andres J, Sanchis LN, Asensio SJM, Fabregat CG, Villanueva PVL, Monsalve Dolz V, et al. Vulvodynia-An Evidence-Based Literature Review and Proposed Treatment Algorithm. *Pain Practice* [Internet]. 2016 Feb [cited 2020 Jun 11];16(2):204–36. Available from: <http://search.ebscohost.com.libproxy.helsinki.fi/login.aspx?direct=true&db=cin20&AN=112708959&site=ehost-live&scope=site>
- (50) Ter Kuile, M.M., Van Lankveld, J.J.D.M., Groot, E.D., Melles, R., Neffs, J., Zandbergen, M., 2007. Cognitive-behavioral therapy for women with lifelong vaginismus: Process and prognostic factors. *Behaviour Research and Therapy*.. doi:10.1016/j.brat.2006.03.013
- (51) Harlow BL, Kunitz CG, Nguyen RH, Rydell SA, Turner RM, MacLehose RF. Prevalence of symptoms consistent with a diagnosis of vulvodynia: population-based estimates from 2 geographic regions. *Am J Obstet Gynecol*. 2014;210:40.e1–e8.

