**Thesis**

# Acupuncture in a Multidisciplinary Approach for Vulvodynia and Chronic Pelvic Pain


submitted by

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Graz, 15.10.2025 Katarina Felicia von der Emde m.p.

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# Zusammenfassung


### Einleitung

Vulvodynie und chronische Unterbauchschmerzen gehören zu den wichtigsten gynäkologischen chronischen Schmerzsyndromen und können die Lebensqualität betroffener Frauen stark beeinträchtigen. Da bisherige konventionelle Therapien häufig nicht ausreichen, gewinnen komplementäre Therapieoptionen immer mehr an Bedeutung.

Das Ziel dieser Diplomarbeit ist es, die Effektivität von Akupunktur auf Schmerzempfinden, Sexualfunktion und Lebensqualität bei Frauen mit Vulvodynie und chronischen Unterbauchschmerzen in einem multidisziplinären Therapiekonzept zu ermitteln.

### Methoden

Im Rahmen dieser Diplomarbeit wurden zwischen Juni 2022 und Oktober 2024 die ersten 34 Patientinnen der Amalia-Studie eingeschlossen und randomisiert einer Akupunkturgruppe oder einer Wartelisten-Kontrollgruppe zugeteilt.

Der primäre Endpunkt ist das subjektive Schmerzempfinden, gemessen anhand der Numerischen Rating-Skala. Sekundäre Outcomes umfassen begleitende Schmerzsymptome, gesundheitsbezogene Lebensqualität, Sexualfunktion und Patientinnenzufriedenheit.

### Resultate

Die Hauptdiagnose war Vulvodynie bei 23 Frauen und chronische Unterbauchschmerzen bei 11 Frauen. Bei Patientinnen mit chronischen Unterbauchschmerzen zeigte sich ein Trend zu einem positiven Effekt durch Akupunktur mit einem Median Change Score von -3 in der Akupunkturgruppe und +1 in der Wartelisten-Kontrollgruppe. Die Ergebnisse bei Vulvodynie-Patientinnen zeigten, dass das subjektive Schmerzempfinden mit einem Median Change Score von -0,5 in beiden Gruppen unverändert blieb. Die Ergebnisse waren nicht signifikant.

Ein positiver Effekt der Therapie bei beiden Schmerzsyndromen konnte jedoch in begleitenden Schmerzsymptomen, subjektiver Verbesserung und der

gesundheitsbezogenen Lebensqualität beobachtet werden. Die Sexualfunktion veränderte sich in beiden Gruppen nicht relevant.

**Konklusion**

Diese erste Zwischenauswertung der Amalia-Studie deutet darauf hin, dass Akupunktur im Rahmen eines multidisziplinären Therapiekonzeptes eine vielversprechende ergänzende Behandlungsoption bei chronischen Unterbauchschmerzen und Vulvodynie sein könnte - insbesondere mit Bezug auf das allgemeine Wohlbefinden und begleitende Schmerzsymptome.

Nach Einschluss des gesamten Patientinnenkollektivs sind umfassendere Erkenntnisse zu Akupunktur im multidisziplinären Therapiekonzept zu erwarten. Langfristig könnten die Ergebnisse dazu beitragen, die Lebensqualität und Therapiekonzepte betroffener Frauen zu verbessern.

# Abstract

### Introduction

Vulvodynia and chronic pelvic pain are two of the most important gynaecologic chronic pain syndromes and have a severe impact on the quality of life of affected women. As conventional therapies often show limited effectiveness, complementary treatment options are gaining importance.

This thesis aims to determine the effectiveness of acupuncture on pain perception, sexual function, and quality of life in women with vulvodynia and chronic pelvic pain in a multidisciplinary treatment approach.

### Methods

Between June 2022 and October 2024, the first 34 patients of the Amalia study were enrolled and randomised to either an acupuncture group or a waiting list control group.

The primary outcome is subjective pain perception measured by the numeric rating scale (NRS). Secondary outcomes include concomitant pain syndromes, health-related quality of life, sexual function, and patient satisfaction.

### Results

The main diagnosis was vulvodynia in 23 patients and chronic pelvic pain in 11 patients. A positive trend in response to acupuncture treatment was observed in patients with chronic pelvic pain, with a median change score of -3 in the acupuncture group and +1 in the waiting list control group. The results for vulvodynia patients showed that subjective pain perception remained unchanged in both groups, with a median change score of -0.5. The results were not significant.

However, a positive effect was observed in health-related quality of life and concomitant pain symptoms. There was no relevant change in sexual function in either group.

**Conclusion**

This interim analysis of the Amalia study suggests that acupuncture in a multidisciplinary approach could be a promising treatment option for treating chronic pelvic pain and vulvodynia, particularly regarding general well-being, and concomitant pain symptoms.

After including the entire patient population, more in-depth findings on the use of acupuncture as part of a multidisciplinary treatment approach are expected. In the long term, the results could contribute to improve the quality of life and treatment options for affected women.

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# Abbreviations

ACOG ..... American College of Obstetricians and Gynecologists

CBT ..... Cognitive Behavioral Therapy

CPP ..... Chronic Pelvic Pain

CRF ..... Case Report Form

CSQ 8 ..... Client Satisfaction Questionnaire

CT ..... Computed Tomography

DSF ..... German Pain Assessment (Deutscher Schmerzfragebogen)

EHP-30 ..... Endometriosis Health Profile Questionnaire

fMRT ..... Functional Magnetic Resonance Imaging

IBS .....Irritable Bowel Syndrome

FSFI ..... Female Sexual Function Index

IC/BPS ..... Bladder Pain Syndrome/Interstitial Cystitis

IPPS ..... International Pelvic Pain Society

ISSVD ..... International Society for the Study of Vulvovaginal Disease

ISSWSH ..... International Society for the Study of Women's Sexual Health

IUD .....Intrauterine Device

MRI ..... Magnetic Resonance Imaging

PET-CT .....Positron Emission Tomography - Computed Tomography

PFM .....Pelvic Floor Muscle

PID ..... Pelvic Inflammatory Disease

PSQ ..... Pain Sensitivity Questionnaire

PVD ..... Provoked Vulvodynia

PHQ-D ..... Patient Health Questionnaire

SF-MPQ ..... Short-form McGill Pain Questionnaire

STRICTA ... Standards for Reporting Interventions in Clinical Trials of Acupuncture

TCA ..... Tricyclic Antidepressant

TCM ..... Traditional Chinese Medicine

ZUF8 ... Client Satisfaction Questionnaire (Fragebogen zur Patientenzufriedenheit)

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# 1 Introduction

## *1.1 Vulvodynia*

### 1.1.1 Definition

Vulvodynia is defined as “vulvar pain of at least three months’ duration, without a clear identifiable cause, which may have potential associated factors”. These potential associated factors include comorbidities, such as irritable bowel syndrome, fibromyalgia or painful bladder syndrome. Other potential associated factors include hormonal, inflammatory, musculoskeletal, genetic, and psychosocial factors.

The International Society for the Study of Women's Sexual Health (ISSWSH), the International Society for the Study of Vulvovaginal Disease (ISSVD) and the International Pelvic Pain Society (IPPS), who implemented this classification in 2015, developed the following descriptors to classify distribution, onset and timing of pain: “Localized, generalized or mixed” for the location of the pain; “provoked, spontaneous or mixed” for situations, when the pain begins; “primary or secondary” for the onset of the pain; and “intermittent, persistent, constant, immediate, delayed” for the temporal pattern. (1) Women often do not describe their symptoms as pain, they are more likely to use terms as itching, burning, stinging, irritation, stabbing and/or rawness. (2)

### 1.1.2 Epidemiology

An estimated 8 % of women under the age of 40 suffer from vulvodynia. (3) According to a study by Reed et al., the prevalence remains stable until the age of 70, after which it declines. When women over 70 were still sexually active, however, the rates of vulvodynia also remained stable, suggesting that the decline in prevalence may be due to a reduction in intercourse, which could cause pain. (4) Overall, about 60 % of women experiencing chronic discomfort in the lower genital tract sought treatment. Among these women, about half consulted multiple physicians, but still 40 % remained without a diagnosis. (5) These findings suggest that there may be a high level of under-reporting.

### 1.1.3 Pathophysiology

There are a lot of different pathways and mechanisms, that contribute to the cause of vulvodynia. (6) Factors, that are associated with vulvodynia, can be split in biomedical and psychosocial factors. New theories and studies have shown that biopsychological factors and physical factors should be seen as depended on each other, instead of considering them separately, like it has been conceptualized traditionally. (7)

*Neuroproliferative factors and central pain mechanisms*

Studies have shown that women with provoked vulvodynia have a higher number of intraepithelial nerve endings than those without. (8) A higher number of nerve endings could explain increased pain sensitivity and a reduced tactile and pain threshold in the vulvar vestibular region. (9) Interestingly, women with vulvodynia also suffer from increased sensitivity in peripheral sites, which leads to the conclusion, that a central component might play a role. (10) This could explain why other chronic pain conditions are very common among women with vulvodynia, such as interstitial cystitis, irritable bowel syndrome and fibromyalgia. The chance, that women with vulvodynia have one of these conditions is higher, than in women without vulvodynia. (11)

*Inflammatory factors*

Studies have shown a link between a high number of inflammatory cells and mast cells and vulvodynia. The first study was published in 1988. (12) A review from 2016, however, showed that the evidence regarding local and systemic inflammation in patients suffering from localized and provoked vulvodynia has its limits and is contradictory. (13) Overall, it can be said that inflammatory cells, and most certainly mast cells, have not been found by all studies; yet an inflammatory infiltrate was found in the vulvar vestibule in most cases, where the pain is located. (6)

*Genetical factors*

Many studies have demonstrated that there might be a genetic compound in the development of vulvodynia. For example, a study by Morgan T et al, found that women with provoked vulvodynia (PVD) who had undergone vulvectomy showed

a genetic predisposition. (14)Mechanisms that have been studied and that might play a role in the genetic predisposition to vulvodynia are genetic polymorphisms that higher the chance of candidiasis or other infections (15), a modified inflammatory response (16) and a higher sensitivity to hormonal fluctuations related to oral contraceptive pills. (17)

*Hormonal factors*

Studies conducted with rodents have shown that circulating sex steroids may regulate the sensory vaginal innervation. (18) This needs to be further demonstrated in women, but it indicates a similar effect. Indeed, a decrease in serum estradiol, which is the effect of oral contraceptives, has been associated with a higher risk of developing adult-onset vulvodynia in a clinic-based study. (19)

*Muscle dysfunction*

Vulvodynia is associated with a certain amount of muscle dysfunction. (20) An increased general tone and decreased coordination, endurance, strength and speed of contraction of the pelvic floor muscle in patients with PVD has been demonstrated. (21)

*Psychosocial factors*

There are multiple studies which show a correlation between psychosocial factors and vulvodynia. It has been demonstrated that women with provoked vulvodynia report a higher number of psychological states, such as of hypervigilance, catastrophizing, fear of pain, anxiety, and depression. (22) Childhood victimization has also been shown to be associated with vulvodynia. Women with vulvodynia show a three times higher chance of living in fear of any abuse than women without vulvodynia. (23,24)

### 1.1.4 Assessment

The assessment of genital pain should contain a detailed pain and psychosocial history. Important are the characteristics and timing of pain, previous treatment and gynecological diagnosis, as well as other comorbid pain conditions and relationship factors. Woman mostly not refer to the symptoms as “pain”, so it might be elicited to ask for “discomfort, irritation, stabbing, a sharp sensation or even

itching". A pelvic examination should be included in the assessment of vulvodynia, as it supports the diagnosis and helps differentiate it from other conditions affecting the vulva, for example yeast infections or atrophic vaginitis. External appearance of the vulva should be assessed, which is typically normal. The most common test for sensitivity at the vestibule is the cotton swab test, where light pressure is applied on certain areas around the vulva vestibule with a cotton swab. (7) The cotton swab test allows to assess if the pain is either generalized or localized, provoked or unprovoked. (25) If possible, the vaginal wall should also be examined by inserting a narrow speculum. Finally, the tone and function of the pelvic floor muscles, as well as the uterus and adnexa, should be palpated. (26)

### 1.1.5 Treatment

There are multiple treatment options that can be considered in the management of vulvodynia. Treatments can be divided in non-invasive, pharmacological and surgical. Usually, therapy starts with non-invasive options, like psychological treatment and pelvic floor physical therapy. If there is no improvement in pain, a medical treatment, such as topical lidocaine should be considered. If these also fail, operative management can be considered. (27) It has also been shown that a multifaceted approach to provoked vulvodynia is beneficial. (28)

*Psychosocial interventions*

Psychosocial interventions, such as Cognitive Behavioral Therapy (CBT), psychoeducation, sex therapy and pain management should be offered to the patient. (7) A randomized clinical trial evaluated group CBT with topical treatment for women with PVD. After six months, analyses indicated a significantly greater reduction on the McGill Pain Questionnaire in the CBT group. Pain catastrophizing was also reduced significantly compared to the group receiving topical treatment. These findings suggest that CBT may have a positive impact on more aspects of dyspareunia than topical treatments. (29)

*Pelvic floor physical therapy*

As vulvodynia is associated with pelvic floor muscle (PFM) dysfunction, multimodal physiotherapy treatment appears to have a positive effect on an increased PFM tone, reduced strength and deficits in coordination and endurance. Treatment

modalities include education, biofeedback, manual and insertion techniques. (30) A randomized clinical trial compared multimodal physiotherapy with overnight lidocaine ointment in women with PVD. The results showed significant improvements in pain intensity, sexual function and distress, as well as satisfaction and participants impression of change compared to topical treatment. (31)

*Pharmacological treatment*

As a topical therapy lidocaine as a cream or gel is often used, to relieve pain during the night or prior to intercourse. (32) Despite the fact that pelvic floor physical therapy and psychotherapy achieve better results in women with PVD, local therapy is still recommended as an effective method of reducing pain during intercourse. (7)

As oral medications, antidepressants are commonly used for neuropathic pain, so these medications have also been tested in women with vulvodynia. However, there are only a few trials that evaluated the use of TCA (Tricyclic Antidepressant) and its effect on reducing the pain in women with vulvodynia has been inconsistent. (33)

Anticonvulsants have also been used in the treatment for vulvodynia, but for a recommendation of this treatment further double-blind, randomized-controlled studies are needed. (34)

If other treatments fail, vestibulectomy is considered. A recently published retrospective cohort study was able to show a significant pain reduction after surgery. Complications occurred in 22.6 % of the study population, all of which were a limited wound dehiscence. (35)

## *1.2 Chronic pelvic pain*

### 1.2.1 Definition

Chronic pelvic pain (CPP) is inconsistently described in the literature but mostly referred to as pain in the lower abdomen or pelvis, which can be cyclic or non-cyclic for a duration of at least more than 6 months. (36) Often other factors, such as nonpelvic pain disorders, like migraines or fibromyalgia and other nonpain

comorbidities, like depression or cognitive impairment, are also associated with this condition. (37)

### 1.2.2 Epidemiology

Between 5.7 and 26.6 % of women are diagnosed with chronic pelvic pain. In Austria the prevalence is estimated to be 5.7 %, whereas the highest prevalence of 26.6 % has been reported in Egypt. These differences might be due to a lack of studies addressing chronic pelvic pain, especially multidisciplinary studies with a multifactorial point of view. (38) Women with Endometriosis often experience a delay between the onset of pelvic pain symptoms and their final diagnosis. A Norwegian study in 2003 showed a mean delay in diagnosis of 6.7 +/- 6.2 years. (39)

### 1.2.3 Diseases associated with CPP

Chronic pelvic pain can be associated with a variety of conditions, gynecological, urological, gastroenterological, psychological and musculoskeletal. The most common conditions of chronic pelvic pain are endometriosis, adhesions, IBS (irritable bowel syndrome) and interstitial cystitis. (40)

*Endometriosis*

Endometriosis describes the presence of endometrial-like tissue outside of the uterus. (41) Around 10 % of women at reproductive age are affected. (42) The lesions can appear in different colors and depths, superficial on the peritoneum or extrapelvic. The condition is still hard to diagnose, which is why many women are often not treated soon enough. Symptoms vary from dysmenorrhea, acyclic pelvic pain, dyspareunia, dyschezia to infertility and fatigue. (43)

*Interstitial Cystitis*

Interstitial Cystitis is defined as an inflammation of the bladder as well as the urethra. The disease can be associated with malformation or injury to the bladder epithelium, allergies, infections, or an autoimmune reaction. Symptoms can include bladder pain, pollakiuria, polyuria, and chronic bladder pressure in varying degrees, while other differential diagnostic diseases must be excluded. (44)

*Pelvic inflammatory disease*

Pelvic inflammatory disease (PID), an infection of the upper genital tract, is also known to cause CPP. Approximately 18-25 % of women develop CPP after an acute PID. Adhesions, scarring and tissue damage after the infection are likely to be the reason for the association, but the relation is discussed controversially in the literature. (40)

### 1.2.4 Pathophysiology

Similar as in Vulvodynia, for chronic pelvic pain a multimodal point of view of the pathophysiology is also favored. (40) There are many factors, that can contribute to the onset of chronic pelvic pain, of which the following are present in current research.

*Inflammation*

In Endometriosis patients a higher number of cytokines like angiogenic factors (VEGF, NGF, BDNF), oncomarkers (CA125) and adhesion molecules in peritoneal fluids have been found, suggesting that cytokines may play a role in the development of chronic pelvic pain in women with endometriosis. (45) Also neurogenic inflammation plays a big role, which describes neuropeptide release, rapid plasma extravasation and edema because of nerve activation. (46) This, together with peripheral sensitization, could be an explain why cyclic pain can develop into non-cyclic pain. (47)

*Neurogenic factors*

Central sensitization is also a very important factor in the pathophysiology, which happens, when an overly intense response by the interneurons is elicited by peripheral pain, which amplifies the perception of pain. This leads to central changes in the activity of the hypothalamic-pituitary-adrenal-axis, endogenous pain inhibition and brain structure. It is not entirely certain if these changes are the cause, the effect or both, but it is discussed, that it might also play a role in developing other chronic pain conditions. (48)

*Myofascial factors*

Myofascial trigger points, which describe small, hard and hyperirritable nodules in the taut bands of skeletal muscle and are painful when compressed, are common among women with CPP. (49) Their formation within the pelvic floor is associated with childbirth, gynecological surgeries, sexual abuse, dyspareunia and injuries. (50) Reactively to severe cramps, a relieving posture is adopted to alleviate the pain, which causes reflex contraction of the pelvic floor muscles and can result in pain and dyspareunia. (40)

*Psychological factors*

A meta-analysis of all risk factors for chronic pelvic pain in women by Latthe et al showed among other risk factors, that non-cyclic pain is associated with childhood physical or sexual abuse, psychological morbidity lifetime sexual abuse or any abuse, anxiety, depression and somatization. (51)

### 1.2.5 Assessment

The assessment of chronic pelvic pain should include a detailed medical history and a thorough gynecological and physical examination of the pelvic and abdominal neuromusculoskeletal system. The medical history should focus on the time course and treatment of pain, triggers, previous medical interventions, medications, allergies, as well as psychosocial factors. (52) In combination with the gynecological and pelvic examination, including transvaginal ultrasound and possibly a cotton swab test, most chronic pelvic pain syndromes can be differentiated, and a presumptive diagnosis can be made. If the transvaginal ultrasound is inconclusive, an abdominal ultrasound should also be performed. If a urinary tract infection, or other inflammatory condition is suspected, a laboratory test can be done. Further imaging methods, such as CT, MRI or PET-CT, might be needed if the clinical and gynecological assessment did not lead to a clear result. (40)

### 1.2.6 Treatment

For the treatment of chronic pelvic pain, medications, surgical interventions, and psychotherapeutic-psychosomatic approaches can be used. However, the

evidence supporting these different approaches is quite limited, as there are only a few controlled studies on the subject. (40) In communicating with patients, it is important that women can feel that they are taken seriously, and that the biological aspect of their pain is not taken out of account. However, the physician should be making clear that emotional coping with the pain can biologically influence pain-excitatory pathways. (53)

*Psychosomatic therapy*

Integrating a psychosomatic treatment into a multidisciplinary treatment concept has showed a significantly better treatment outcome. A study was able to show that an integrated approach that included somatic, psychological, dietary, environmental and physiotherapeutic factors from the outset resulted in a significant in pelvic pain compared with focusing only on somatic causes alone and performing laparoscopy. (54)

*Physiotherapy*

A systematic review of physiotherapy management in chronic pelvic pain, including trigger point therapy, biofeedback, Thiele massage, Mensendieck somatocognitive therapy and aerobic exercises was able to show significant improvements in pain assessments. (55)

*Pharmacological therapy*

Analgesics, such as Metamizole, Paracetamol, COX-2 Inhibitors or nonsteroidal antirheumatics, should not be used permanently. A temporary use (1-8 days) in case of pain exacerbation can be recommended. (40)

According to the ACOG (American College of Obstetricians and Gynecologists) guidelines, a treatment with gabapentin, pregabalin and anti-depressants can be recommended. (52) A review including four randomized controlled studies demonstrated a reduction of pain in women using gabapentin for 6 months and there were no statistically significant differences observed in the total incidence of adverse events. (56)

The use of opioids in the management of CPP is controversial, as it is known, that opioids have a high risk of adverse events, tolerance, overdose and dependence. (52) One study from 2018 was able to show, that a non-pharmacological and non-

opioid treatment has more benefits, also in adverse events, in comparison to a chronic use of opioids. (57)

Hormonal therapy is also an approach in treatment, especially if the pain is cyclic, which applies to 81 % of women with CPP. A continuous utilization of progesterone or combined oral contraceptives are used to initiate amenorrhea. (53)

*Surgical Treatment*

Surgical treatment is considered in 2 different cases of CPP. One of them being the presence of organ pathologies, such as endometriosis or pelvic masses. Secondly, surgical interventions are used only for a symptomatic effect, which is based on the interruption or modulation of the afferent nerve transmission of the pelvis, such as uterosacral nerve ablation or presacral neurectomy, neuromodulation and neurolysis. (40)

## *1.3 Acupuncture*

### 1.3.1 Fundamentals of acupuncture

Acupuncture is a treatment technique of stimulating anatomical locations, mostly by inserting thin, metallic, solid needles on the skin. It is part of Traditional Chinese Medicine (TCM), which is one of the oldest healing systems and based on ancient Chinese concepts of health, illness, and development of disease. (58,59)

*The flow of Qi*

These Chinese concepts root in an understanding, that all natural phenomena are classified into Yin and Yang, which are two opposites, yet complementary, interdependent and interchangeable aspects of nature. Yin is the material aspect of the organism and Yang refers to the function. (59) In TCM, health is seen as a balance of yin and yang and unhindered flow of Qi and blood. Qi, also described as the energy, is constantly circulating through the body, the organs and the meridians. A disturbance of Qi can induce disease, as can disease disrupt the circulation of Qi. Acupuncture can regulate the flow of Qi. It is important to know that acupuncture, as a regulatory treatment, can only be a promising treatment for disturbed but not destroyed conditions. Through the insertion and manipulation of

the acupuncture needle into the skin, a so-called De-Qi sensation is triggered, which is a dull, pulling-like feeling and a sign that the circulation within the meridian has been activated. (58)

*Meridians*

Meridians are energetic channels which transport the vital energy Qi and blood. These channels serve as “guidelines” for the localization of acupuncture points. There are 12 main meridians which run as longitudinal lines on the body. Every meridian is part of a system, which belongs to a specific organ. (58)

*Acupuncture points*

There are approximately 700 acupuncture points in total, 361 of which are located on the meridians. (58) The 361 meridian acupuncture points can be seen as areas, where internal structures are being projected. These points are stimulated with needles during acupuncture treatment, which induces a local and a regional effect. The regional effect refers to the course of each meridian.

The points can be located with the help of anatomical landmarks, thumb width and the proportional measurement “regional cun”. The width of the thumb distal to the interphalangeal joint corresponds to one cun. Regional cun are defined proportional measurements which are determined by the relation between anatomical structures. For example, the distance from the symphysis to the umbilicus is 5 cun and from the umbilicus to the xiphoid processus is 8 cun. (60)

*Segment acupuncture*

Segmental anatomy is an approach to explaining acupuncture from a scientific, factual point of view and can even largely replace and explain the ancient Chinese theories. Internal organs, bones, skin, and muscles are supplied by a spinal nerve and the supply area of this nerve is called a segment. Due to evolution segments are scattered throughout the body in segment parts such as dermatomes, sclerotomes, enterotomes, and myotomes. They are all connected by the spinal nerves and explain, why acupuncture points are often distant from the site of pain. The autonomic nervous system, especially the sympathetic nervous system, also plays a central role in understanding acupuncture and how it aims to reach remote areas and internal organs from the body surface. Knowing the innervation areas of

the autonomic nervous system is essential to understanding the projections and interactions of the body surface and the internal organs. (61)

### 1.3.2 Mechanisms of acupuncture

Various studies have focused on the different mechanisms, that might explain the effects of acupuncture. For a better understanding of the neural effects, fMRI (functional Magnetic Resonance Imaging) studies have been carried out. A review of 82 studies showed that acupuncture at acupoints, relating to the disease, were able to modulate regions of the brain associated to the disease. Also, a modulating effect on the connectivity of the brain has been demonstrated. (62) Neuromodulators and neurotransmitters, such as endorphins, serotonin, ATP, etc. also seem to play a major role in acupuncture analgesia. However, the overall mechanism of the effect acupuncture is not yet understood, but modulation of the nervous system may play a central role. (63)

### 1.3.3 Efficacy of acupuncture in CPP and Vulvodynia

Substantial evidence demonstrates the efficacy of acupuncture on chronic pain. A patient data meta-analysis of 20 827 patients was able to demonstrate the superior effect of acupuncture compared to sham and no-acupuncture in four different pain conditions: nonspecific musculoskeletal pain, osteoarthritis, chronic headache, or shoulder pain. A persistence over time, with only a small decrease of 15 % after one year has also been shown. (64)

However, the evidence for acupuncture in CPP and Vulvodynia is limited. A systemic review and metanalysis study of the analgesic efficacy of acupuncture on CPP, which included seventeen studies with 1455 patients, showed a significant lower pain level in patients treated with acupuncture compared to the control group. (65) A randomized controlled feasibility study from Australia compared manual acupuncture plus usual care versus usual care alone in patients with endometriosis, and concluded, that acupuncture is an “acceptable and well-tolerated treatment”. (66) A study to evaluate the efficacy of acupuncture in primary dysmenorrhea demonstrated a significant reduction in pain severity, muscle cramps and systemic symptoms. (67)

The first randomized wait-list controlled pilot study on acupuncture for the treatment of vulvodynia was published by Schlaeger et al. in 2015 and included 36 women with vulvodynia. The results showed a significantly reduction in vulvar pain and dyspareunia and improvement in sexual functioning in women treated with acupuncture compared to a wait-list control group. (68)

# 2 Materials and Methods

## *2.1 Study Design*

The study design is a randomized controlled clinical trial carried out at the Department of Gynecology, Medical University of Graz. The following description of methods is based on the official AMALIA (**A**cupuncture in a **m**ultidisciplinary **a**pproach for vu**l**vodyn**ia** and chronic pelvic pain) study protocol. (69) Participants were randomly allocated to the acupuncture group or waiting list control group. Assessments were taken on the day of randomization, after 3 months and after 6 months. The protocols adhere to the STRICTA (Standards for Reporting Interventions in Clinical Trials of Acupuncture) guidelines. The guidelines stand for completeness and transparency of acupuncture trials, so that they can be better replicated and interpreted. (70)

The Amalia study was initiated in June 2022 and is still ongoing at the Department of Gynecology at the Medical University of Graz. A total of 68 participants are planned to participate in the study. For this diploma thesis, a cut-off of 34 patients has been made, as this was the number of patients who were enrolled and completed treatment in October 2024.

## *2.2 Study Population*

34 patients aged between 18 and 80 years were recruited either from the outpatient clinic for gynecologic pain at the Department of Gynecology of the Medical University of Graz or a specialist gynecology center in Graz, St.Peter.

Female participants with a history of chronic pelvic pain at least for the past 6 months and/or a history of vulvodynia of at least 6 months, who received multidisciplinary treatment for at least 3 months and signed an informed consent were included in the study.

Female participants who were pregnant, had a current malignancy or a major neurologic or psychiatric morbidity and participated in the Lydia trial (Lasertherapy for vulvodynia) were excluded from the study. (69)

## *2.3 Study Setting*

Most of the participants who were included in the study were first referred to the outpatient clinic for gynecological pain for the management of their symptoms, such as vulvar pain or chronic pelvic pain. At the outpatient clinic or specialist gynecology center they received a thorough gynecological examination and psychological assessment using a standardized protocol and additional questionnaires. After the assessment a diagnosis of vulvodynia and/or CPP was made. Following the diagnosis, they were offered several different treatment modalities, which were thoroughly discussed with the practitioner. The multimodal treatment included pelvic floor physiotherapy, psychological assessment, topical and/or oral medication depending on the needs of each patient. The therapy also included an education about the pattern of gynecological pain, possible causes, psychosomatic factors and mechanisms of pain. They were also informed about genital care and hygiene and local therapies. Psychological therapy was recommended to all patients, which they were able receive at the clinic. Specialized physiotherapists were suggested for pelvic floor therapy.

Women who were potential study participants and who had already been seen or treated in the past received a letter with information about the study and an invitation to a control visit. At this visit, they were examined and screened for eligibility for the study and potentially enrolled.

Patients were included in the study and randomized after having received multimodal treatment for at least 3 months and still experiencing symptoms.

## *2.4 Intervention*

### 2.4.1 Study groups and randomization

Before starting acupuncture treatment, patients were randomized into two different study groups: an acupuncture and a waiting list control group. Randomization was conducted using an internet-based randomization program by the Medical University of Graz called “randomizer”. The randomization was conducted during the baseline visit in a 1:1 ratio. Each patient was given an identification code and a number from 1 to 34. Patients were told which group they have been allocated to.

The participants were also stratified according to their main diagnosis – vulvodynia or chronic pelvic pain.

*Acupuncture group*

Patients randomized to the acupuncture group received 10 acupuncture treatments over 3 months. It was provided without any costs to the patients. During the treatment, patients were advised to continue the ongoing standard therapy but not to start new treatments. (69)

*Acupuncture treatment*

The acupuncture treatment was carried out according to a standardized protocol by certified acupuncturists at two study acupuncture clinics in Graz. The acupuncture technique was based on segmental acupuncture. Each participant received a fixed set of acupuncture points on the lower abdomen, back, extremities, head and ear. Needles of 0.3 mm diameter and 30 mm length were placed on following points on the back and lower abdomen in the area between Th11 and L1: Kidney 13 and 14, alternating unilaterally, and Ren 2 and 3 on the midline. Classic points were punctured on the head and extremities: Stomach 36, Spleen 6, Large Intestine 4, Liver 3, Bladder 60, all bilaterally and Du 20 on the midline. On the ear different needles were used with a diameter of 0.2 mm and 20 mm length. The ear points were thalamus, lower pelvis, genital system, Veg.I (sympathetic) and Heart. Ear acupuncture combined French and Chinese acupuncture theories. The needles were inserted manually to a depth of about 5 to 10 mm under the skin and left for 20 minutes.

A “deqi sensation” was not a required part of the protocol, although it may have been assessed. Body points were assigned using an electric potentiometer and ear points were assigned to positions where they were generally accepted.

According to a time schedule, the first three sessions were given within the first 14 days, after which the next five sessions were given every week and the last two every two weeks. The total duration of the 10 treatments was approximately 12 weeks. (69)

*Waiting list control group*

Participants randomized to the waiting list group did not receive any acupuncture treatment for the first 3 months but were advised to continue standard therapy. They were asked not to start any new treatment during this period, including acupuncture for any condition. After the 3-month waiting period, participants in the waiting list group were also offered the same treatment as the acupuncture group for 3 months. (69)

*Assessments*

Assessments were taken at baseline, after 3 and 6 months. Baseline assessments were made on the same day as randomization either at the outpatient clinic for gynecological pain syndromes or at the specialist gynecology center in Graz. The baseline assessment included a gynecological examination, anamnesis and self-administered questionnaires. All the questionnaires discussed in chapter 2.5.2.1 have been filled out at each assessment, only the baseline assessment included additional questions about the history and characteristics of pain. In the gynecological examination an inspection of the vulva, cotton swab test and palpation of the pelvic floor was done and documented in a case report form by the practitioner.

For the subsequent assessments at 3 and 6 months, participants needed to visit the outpatient clinic for gynecological pain syndromes for another gynecological examination and to complete the questionnaires.

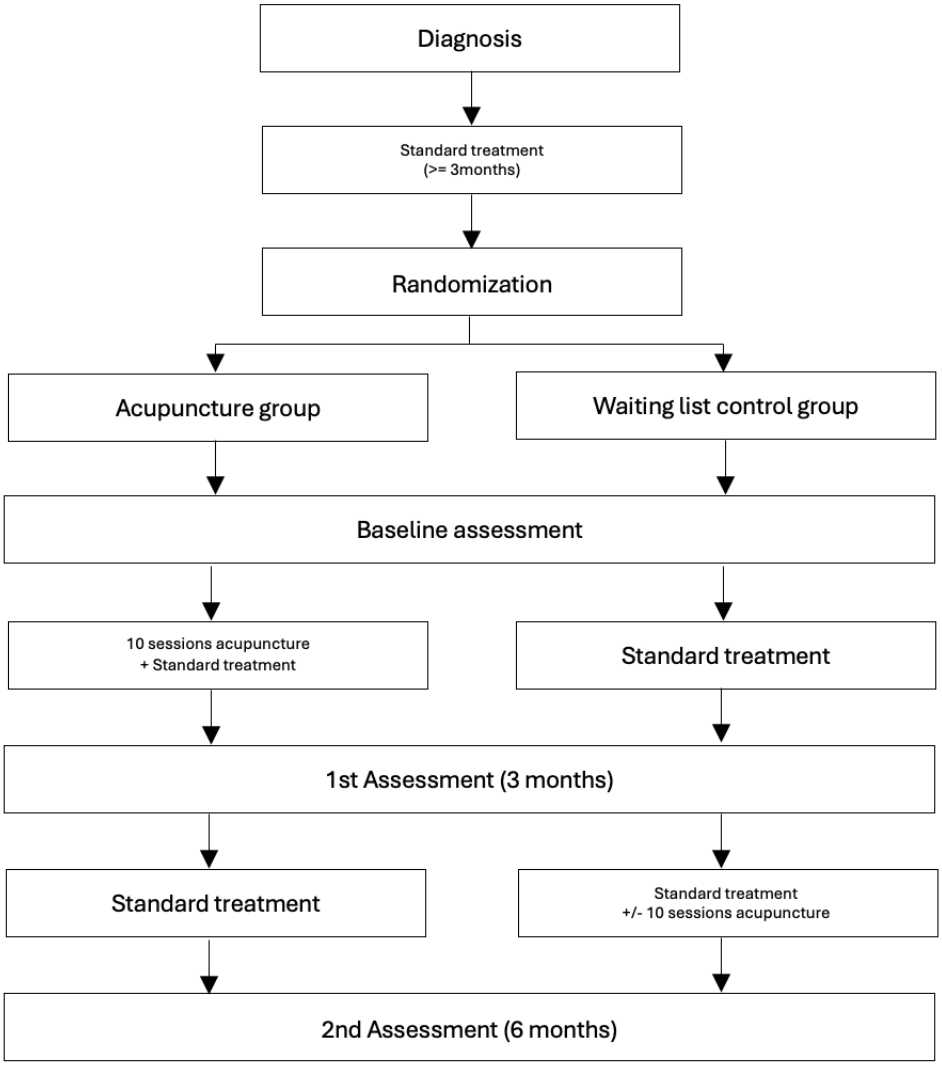


*Figure 1: Timetable*

## *2.5 Outcome Measures*

### 2.5.1 Primary outcome

The primary outcome was the difference in the subjective pain perception measured by a numeric rating scale (NRS) at three and six months after randomization compared to baseline. Pain in the lower abdomen or vulva, depending on the diagnosis CPP and/or Vulvodynia was recorded in a self-administered written assessment. The level of average pain during the last 4 weeks was rated by the participants from 0, which is equivalent to no pain, to 10, which is the worst pain imaginable.

### 2.5.2 Secondary outcomes

The secondary outcomes were changes in the concomitant pain symptoms, such as dysmenorrhea, dyspareunia, pelvic and vulvar pain assessed by the numeric rating scale (NRS), subjective improvement and health-related quality of life. Patient treatment satisfaction, concurrent multimodal therapy and pain medications were also measured. Secondary outcomes were assessed at baseline, three and six months after randomization.

#### 2.5.2.1 Questionnaires – Health-related quality of life

To assess the health-related quality of life, several questionnaires have been used for this study, including the Endometriosis Health Profile Questionnaire (EHP-30), Pain sensitivity Questionnaire (PSQ) and Patient Health Questionnaire (PHQ-D).

*Endometriosis Health Profile Questionnaire (EHP-30)*

The endometriosis Health Profile (EHP-30) was developed to assess the health-related quality of life (HRQoL) of women who are living with endometriosis. As CPP is a condition associated with endometriosis, the questionnaire is also a valid and reliable tool for assessing gynecological pain syndromes. The core instrument of the questionnaire consists of 30 items covering the following topic: Pain, Control and Powerlessness, Social Support, Emotional well-being and Self-Image. Results are scored either at the domain level, at the level of individual items, or as a total score of all 30 items. (71)

*Pain Sensitivity Questionnaire (PSQ)*

With the Pain Sensitivity Questionnaire, the individual pain sensitivity can be determined. Participants were asked to rate pain intensity of daily life situations. (61)

*Patient Health Questionnaire (PHQ-D)*

The PHQ 9 questionnaire has been developed for the screening of depression and is useful in determining the degree of the disease. The PHQ D is a translated version of the PHQ and consists of several modules.

*FSFI – Female Sexual Function Index (FSFI)*

The Female Sexual Function Index is a questionnaire designed to measure a patient's sexual function, including factors such as arousal, desire, pain, satisfaction, lubrication and orgasm. The questionnaire is self-reported and consists of 19-items, each with a 5-points scale counting from 1 to 5, with higher scores indicating better sexual function. (72)

*Client Satisfaction Questionnaire – (ZUF8)*

Patient treatment satisfaction was assessed using a validated, slightly adapted questionnaire called "Fragebogen zur Patientenzufriedenheit - ZUF8", a German translated version of the CSQ 8-Client Satisfaction Questionnaire. It consists of 8 items each with 4 possible answers on a scale from not satisfied to very satisfied. A score can be calculated and should then reflect the participant's satisfaction. This questionnaire was only evaluated at 3 months. (73)

#### 2.5.2.2 Subjective Improvement

Subjective Improvement has been assessed via a 7-point rating scale, also known as the "The Patient Global Impression of Improvement". The PGI is an international tool for describing the improvement in pain from "much better" to "much worse".

## *2.6 Data collection and management*

### 2.6.1 Data protection

Data was recorded on paper versions of questionnaires and case report forms, which were labelled only with the identification code to which participants were assigned to, a combination of the first two letters of their first name and the first two letters of their last name, and a serial number. Paper forms were anonymously transferred into SPSS. Analyses were carried out using only identification codes and no personal identifying information. Data were handled in accordance with the data protection law.

### 2.6.2 Declaration of consent

Prior to Enrollment, patients were fully informed about the voluntary participation and withdrawal at any time, data protection, procedures and the aims of the study.

### 2.6.3 Ethical issues

The AMALIA study was approved by the ethics committee of the Medical University of Graz. It is a non-profit, patient-oriented study conferring to the Declaration of Helsinki to secure patients' data and privacy.

## *2.7 Statistical analyses*

This trial was designed to determine whether there is a difference regarding the subjective pain perception of vulvodynia and chronic pelvic pain between the acupuncture group and the waiting list control group. The sample size for this trial was estimated based on the result of a previous study by Schlaeger et al. A treatment difference between 2.0 and 2.5 with a standard deviation between 2.0 and 2.5 of both groups was assumed. Considering a power of 80 %, 12 to 25 patients would have to be included in each group to detect significant treatment differences if analyzed with a t-test. If analyzed with a Mann-Whitney U-Test 14 to 30 would be needed. 30 participants per study arm were included to cover the littlest effect. With a drop-out rate of 10 %, 68 participants will take part in the study.

For this diploma thesis a cut-off at 34 patients has been made, as this was the number of patients included and finished with treatment, in October 2024. Statistical analyses and graphical representations were performed using IBM SPSS Statistics.

As part of this diploma thesis data from case report forms and questionnaires from 34 participants were manually transferred into SPSS. In case of missing questionnaires patients were contacted and data was subsequently added. All patients who started multimodal therapy with either acupuncture or no acupuncture were included in the intention-to-treat-analyses.

Participants were compared according to their stratification. The main outcome, the NRS score assessed at baseline, after 3 and after 6 months, was analyzed

using a Mann-Whitney U-test. For data presentation, the median of the NRS Score was used, as recommended in the literature for the analysis of non-normally distributed and ordinal data. (74)

The data analysis of this diploma thesis focused on the difference between baseline and 3 months, as the evaluation of the 6-month data would go beyond the scope of this diploma thesis. However, the median NRS pain score of the main outcome between baseline and 6 months is illustrated in a line chart for an overview of the long-term trend.

# 3 Results

In the following chapter the results of the data analysis and the main findings of the study are presented in graphs and diagrams.

## *3.1 Demographic characteristics*

Between July 2022 and October 2024 34 patients (n=34) have been included in the study.

17 patients (n=17) were randomized into the acupuncture group and 17 patients (n=17) into the waiting list group.

The median age of the 17 patients in the acupuncture group was 31 (IQR: 25-35.5) years, the median age in the waiting list control group 36 (IQR: 23.5-52.5) years.

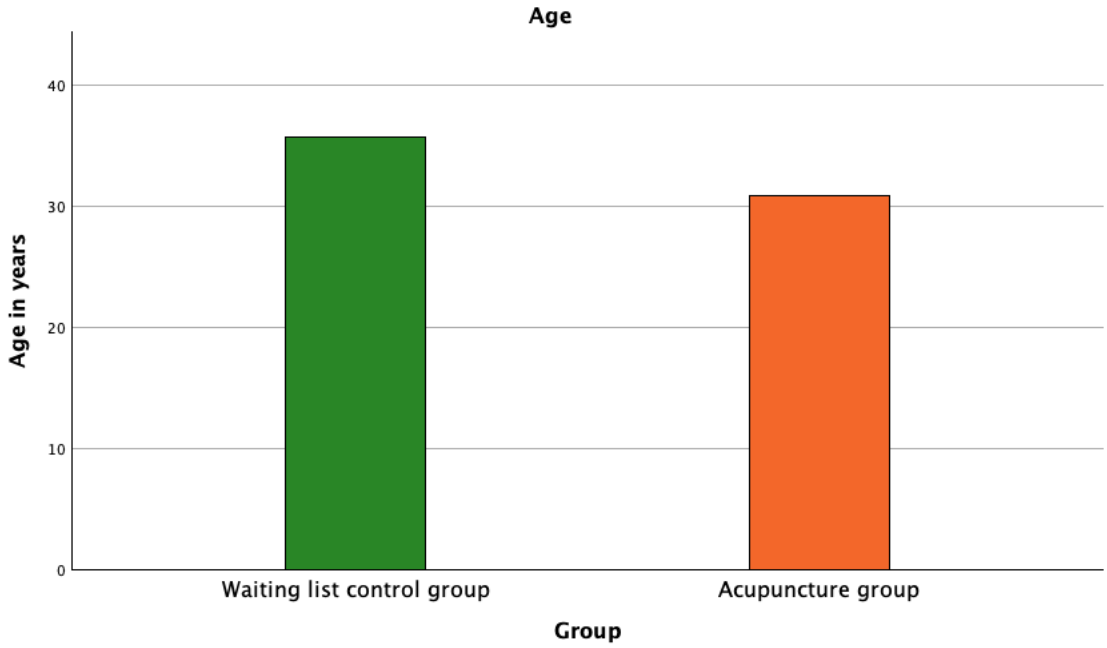


*Figure 2: Age Distribution*

6 women in the waiting list control group and 1 in the acupuncture group were in the menopause.

5 women in the control group and 3 in the acupuncture group gave birth to at least one child.

Out of the 17 women in the waiting list control group, 9 had no contraception, 6 used contraception with a condom, 1 used hormonal contraception and 1 a gold IUD (intrauterine device). Out of the 17 women in the acupuncture group, 5 had no contraception, 3 were using condoms and 6 hormonal contraception.

9 women in the waiting list control group and 10 in the acupuncture group were having intercourse regularly.

2 women regularly smoked in the waiting list control group and 1 in the acupuncture group.

*Table 1: Baseline characteristics*

| **Baseline characteristics** | **Waiting list control group (n)** | **%** | **Acupuncture group (n)** | **%** |
|---|---|---|---|---|
| Menopause | 6 | 35.3 | 1 | 5.9 |
| Parity | 5 | 29.4 | 3 | 17.6 |
| Hormonal contraception | 1 | 5.9 | 6 | 35.3 |
| Non-hormonal contraception | 7 | 41.2 | 3 | 17.6 |
| No contraception | 9 | 52.9 | 5 | 29.4 |
| Intercourse | 9 | 52.9 | 10 | 58.8 |
| Smoking | 2 | 11.7 | 1 | 5.9 |

The relationship status in the two groups was similar. 5 participants in the waiting list control were in a relationship with a duration of >10 years, in the acupuncture group 3. 3 participants in the waiting list control group were in no relationship and 4 in the acupuncture group.

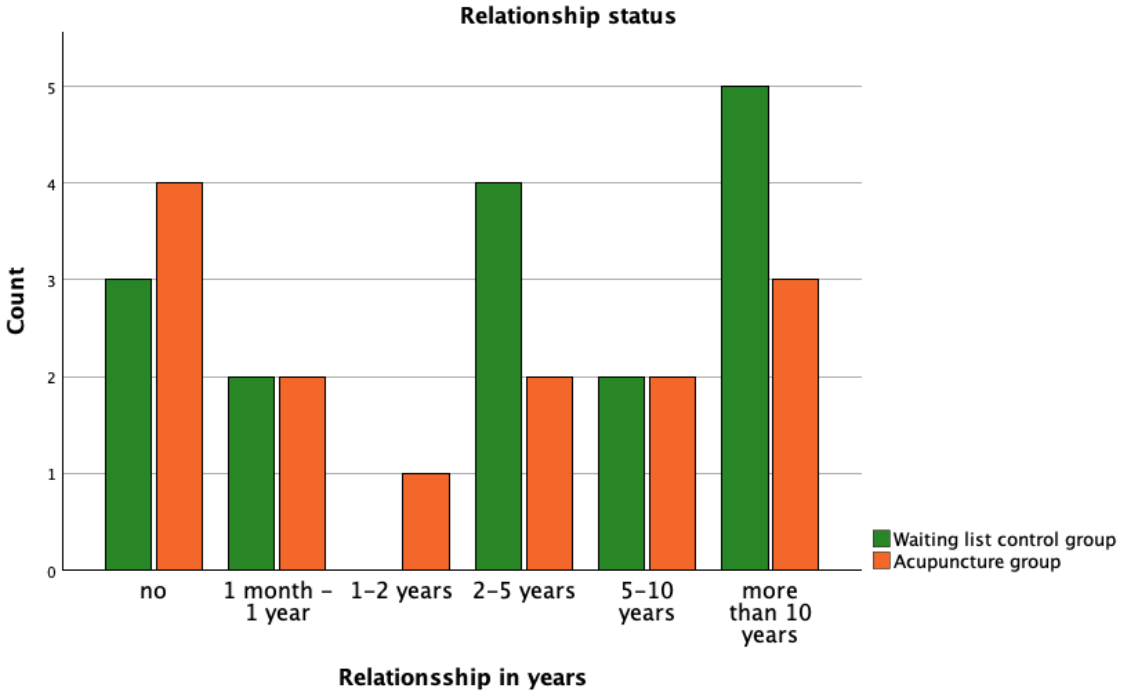


*Figure 3: Relationship status*

## *3.2 Vulvodynia and CPP*

12 women in the acupuncture group and 15 women in the waiting list control group suffered from vulvodynia.

Overall, most women suffered from vulvodynia 2-5 years and the distribution of women suffering less than 2 years or over 5 years, was relatively similar. Notably, the number of women suffering from vulvodynia for 2-5 years was higher in the waiting list control group.

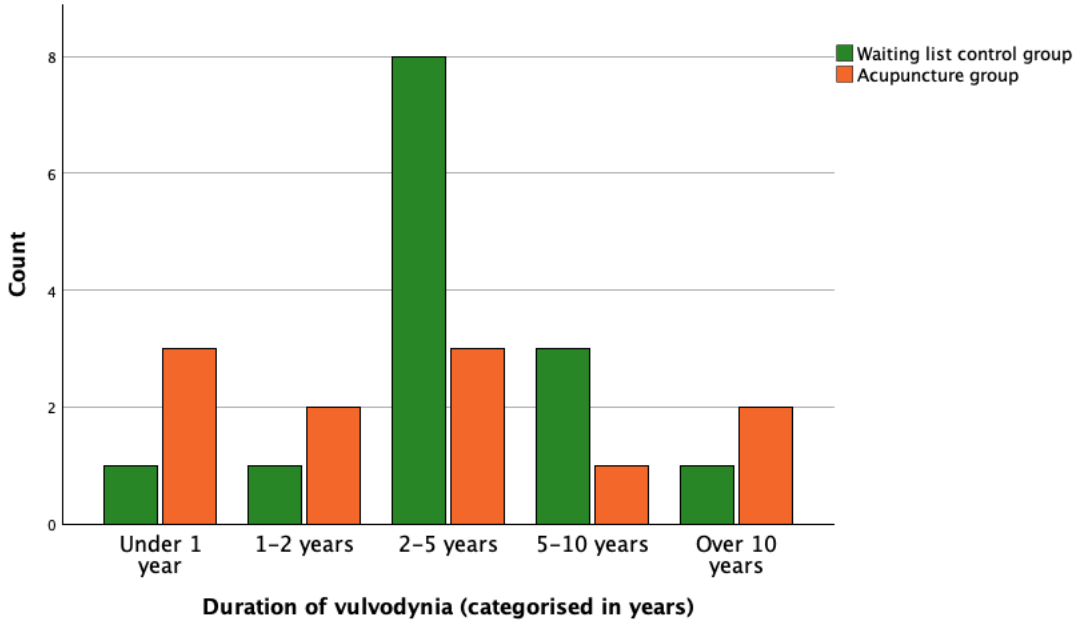


*Figure 4: Duration of vulvodynia*

21 women had secondary vulvodynia, whereas only 6 had primary vulvodynia. The number of primary forms was higher with 4 women in the acupuncture group, and the number of secondary forms was higher in the waiting list control group with 13 women. Data was missing in 7 patients.

*Table 2: Distribution of primary and secondary vulvodynia*

| **Vulvodynia** | **Waiting list control group (n)** | **%** | **Acupuncture group (n)** | **%** |
|---|---|---|---|---|
| Primary | 2 | 11.7 | 4 | 23.5 |
| Secondary | 13 | 76.4 | 8 | 47.1 |
| Missing data | 2 | 11.7 | 5 | 29.4 |

Most women in both groups suffered from localized Vulvodynia. 11 women in the waiting list group and 8 in the acupuncture group. Only 1 woman in the acupuncture group and 3 women in the waiting list control group had generalized Vulvodynia. In 11 participants data was missing.

*Table 3: Distribution of localized and generalized vulvodynia*

| **Vulvodynia** | **Waiting list control group (n)** | **%** | **Acupuncture group (n)** | **%** |
|---|---|---|---|---|
| Localized | 11 | 64.7 | 8 | 47.1 |
| Generalized | 3 | 17.6 | 1 | 5.9 |
| Missing data | 3 | 17.6 | 8 | 47.1 |

Most women suffered from provoked vulvodynia (12 in the waiting list control group and 7 in the acupuncture group). 2 participants in each group had a non-provoked form of vulvodynia. Data was missing in a total of 11 participants.

*Table 4: Distribution of provoked and not provoked vulvodynia*

| **Vulvodynia** | **Waiting list control group (n)** | **%** | **Acupuncture group (n)** | **%** |
|---|---|---|---|---|
| Provoked | 12 | 70.6 | 7 | 41.2 |
| Not provoked | 2 | 11.8 | 2 | 11.8 |
| Missing data | 3 | 17.6 | 8 | 47.1 |

8 women in the acupuncture group and 6 women in the waiting list control group suffered from chronic pelvic pain.

Most of the women in the acupuncture group suffered from CPP for 1-2 years, 2-5 years and over 10 years. Only one person had CPP under one year and one for 5-10 years.

In the waiting list control group, the most participants had CPP for 2-5 years and 2 women between 5-10 years and only one over 10 years.

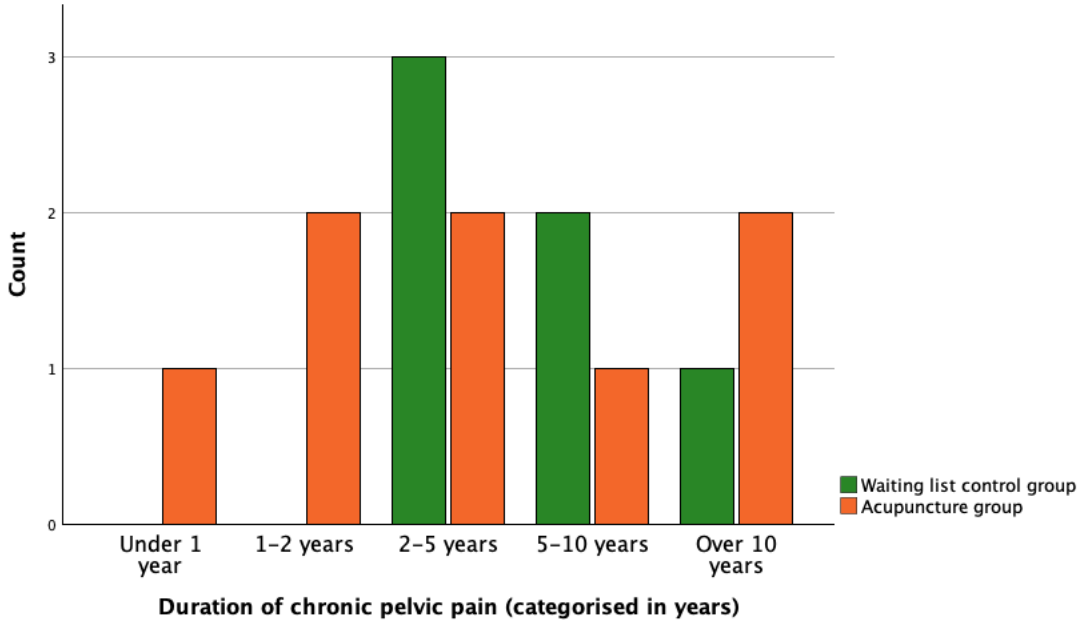


*Figure 5: Duration of chronic pelvic pain*

## *3.3 Comorbidities*

The most common comorbidities among the study groups were painful bladder syndrome (n=13), depression (n=9), recurrent cystitis (n=8) and musculoskeletal pain (13).

*Table 5: Comorbidities*

| **Comorbidity** | **Waiting list control group (n)** | **%** | **Acupuncture group (n)** | **%** |
|---|---|---|---|---|
| Recurrent Cystitis | 6 | 35.3 | 2 | 11.8 |
| Painful Bladder Syndrome | 6 | 35.3 | 7 | 41.2 |
| Urinary Urge | 3 | 17.6 | 6 | 35.3 |
| Descensus uteri | 3 | 17.6 | 0 | 0 |
| Urinary Incontinence | 0 | 0 | 2 | 11.8 |
| Fecal incontinence | 1 | 5.9 | 0 | 0 |

| | | | | |
|---|---|---|---|---|
| Irritable bowel syndrome | 2 | 11.8 | 3 | 17.6 |
| Food intolerance | 2 | 11.8 | 2 | 11.8 |
| Musculoskeletal pain | 8 | 47.1 | 5 | 29.4 |
| Migraine | 1 | 5.9 | 4 | 23.5 |
| Autoimmune disease | 0 | 0 | 0 | 0 |
| Depression | 3 | 17.6 | 6 | 35.3 |
| Psychiatric disorder | 5 | 29.4 | 6 | 35.3 |
| Others | 2 | 11.8 | 4 | 23.5 |

One participant in the waiting list control group had confirmed endometriosis by surgery. In the acupuncture group, also one was confirmed by surgery and one by imaging. 2 women in the acupuncture group had suspected endometriosis by imaging, while 2 in both groups had suspected endometriosis by history taking. 11 women in the waiting list control group and 8 in the acupuncture group had no indication for endometriosis. 3 women in the waiting list control group and 1 in the acupuncture group were postmenopausal.

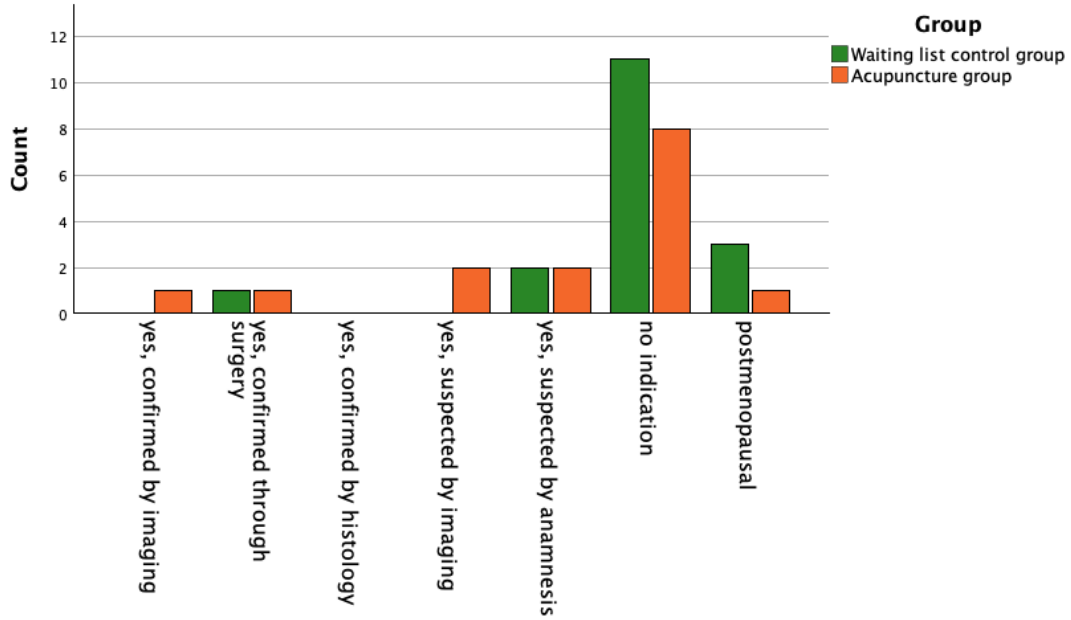


*Figure 6: Endometriosis distribution*

## *3.4 Previous Treatments*

Previous treatments varied from local care products to psychotherapy. Overall, the treatment most used in both groups were local care products (n=23), psychotherapy (n=19) and pelvic floor physical therapy (n=18).

*Table 6: Previous treatments*

| **Previous treatments** | **Waiting list control group (n=17)** | **%** | **Acupuncture group (n=17)** | **%** |
|---|---|---|---|---|
| Local care products | 13 | 76.5 | 10 | 58.8 |
| Infection treatment | 7 | 41.2 | 5 | 29.4 |
| Hormone therapy | 8 | 47.1 | 2 | 11.8 |
| Cortisone | 3 | 17.6 | 3 | 17.6 |
| Injection therapy | 2 | 11.8 | 2 | 11.8 |
| Local Anesthesia | 8 | 47.1 | 2 | 11.8 |
| Psychological therapy | 13 | 76.5 | 6 | 35.3 |
| Pelvic floor physical therapy | 9 | 52.9 | 9 | 52.9 |
| Complementary medicine | 2 | 11.8 | 3 | 17.6 |
| Laser therapy | 2 | 11.8 | 1 | 5.9 |
| Bladder instillation | 1 | 5.9 | 2 | 11.8 |
| Acupuncture | 5 | 29.4 | 1 | 5.9 |
| Paracetamol | 7 | 41.2 | 7 | 41.2 |
| Opioid | 0 | 0 | 0 | 0 |
| Antidepressant or Antineuroleptics | 6 | 35.3 | 4 | 23.5 |

## 3.5 Concurrent multimodal therapies

13 participants in the waiting list control group and 12 in the acupuncture group continued their ongoing therapy between baseline and the 3-month-follow-up. 3 participants in the waiting list control group started a new therapy and none in the acupuncture group.

Most women used local vulva care products, 9 in the waiting list control group and 6 in the acupuncture group. Other therapies were used less frequently, with 4 women in the waiting list control group and one in the acupuncture group.

*Table 7: Concurrent multimodal therapies after 3 months*

| **Therapy** | **Waiting list control group (n)** | **%** | **Acupuncture group (n)** | **%** |
|---|---|---|---|---|
| Local care products | 9 | 52.9 | 6 | 35.3 |
| Physical therapy | 7 | 41.2 | 4 | 23.5 |
| Psychological therapy | 8 | 47.1 | 5 | 29.4 |
| Medication | 6 | 35.3 | 6 | 35.3 |
| Others | 4 | 23.5 | 1 | 5.9 |
| Continuing ongoing therapy | 13 | 76.5 | 12 | 70.6 |
| Start new therapy | 3 | 17.6 | 0 | 0 |

## 3.6 Primary outcome

The main study outcome was the difference in subjective pain perception of vulvodynia and chronic pelvic pain, measured by a numeric rating scale (NRS) at baseline, three and six months after randomization. The patients were stratified according to their main diagnosis. The main diagnosis was vulvodynia in 23 women and CPP in 11 women.

### 3.6.1 Vulvodynia

The difference in pain perception in patients with the main diagnosis of vulvodynia between baseline and three months could be assessed in 18 patients (78.3%). 11 in the waiting list control group and 7 in the acupuncture group. Baseline data on subjective pain perception in patients with a main diagnosis of vulvodynia was missing for 3 patients at baseline due to incomplete questionnaires, and for 4 patients at the 3-month follow-up due to non-attendance.

The change in pain perception between baseline and three months follow-up was slightly higher in the acupuncture group compared to the control group. The median change score was the same in both groups with -0.5 and thus showed no statistical significance (p=0.93).

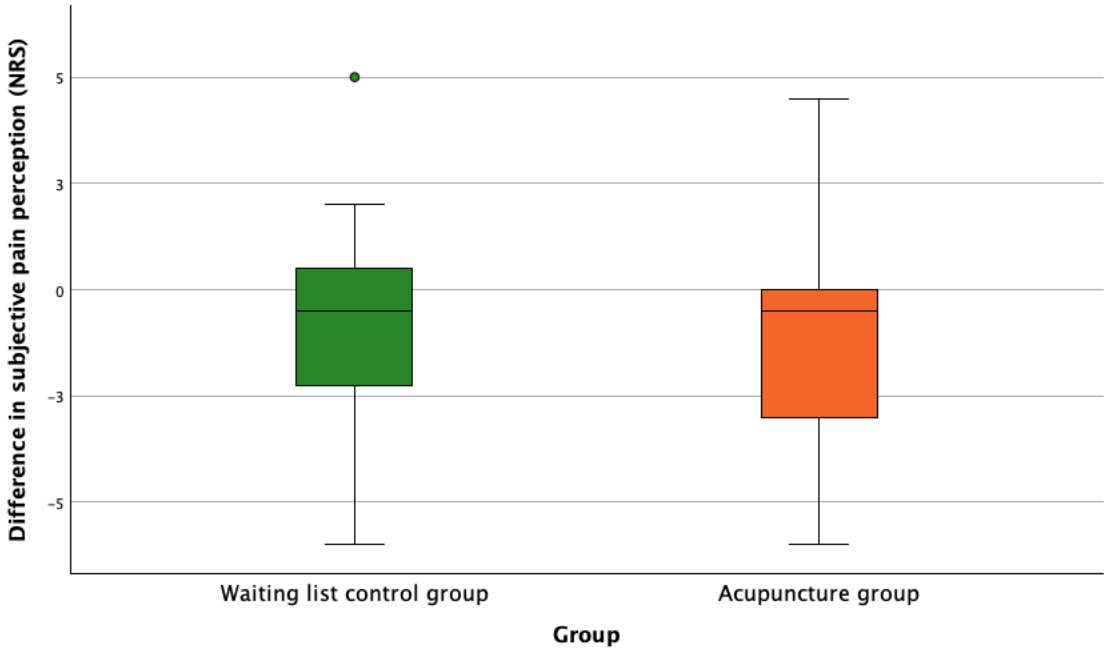


*Figure 7: Change in subjective pain perception of vulvar pain between baseline and 3 months*

*Table 8: Descriptive statistics – Change in subjective pain perception of vulvar pain after 3 months*

| Group | n | Median Change | Mean Change | Standard deviation | Minimum | Maxi-mum | p-Value |
|---|---|---|---|---|---|---|---|
| Acupunc-ture group | 7 | -0.5 | -1.1 | 3.5 | -6 | 4.5 | 0.93 |
| Waiting list control group | 11 | -0.5 | -0.7 | 2.9 | -6 | 5 | |

The following graph shows the group median of subjective pain intensity (NRS 0-10) reported by participants at each time point. However, subjective vulvar pain could only be assessed in 15 participants at all three follow-ups, compared to 18 participants between baseline and the three-month follow-up, as 6 patients did not attend the six-month follow-up. Among these 15 participants, the median pain levels of both groups were comparable at baseline (Waiting list control group: 6.75 and acupuncture group: 7). After 3 months, the acupuncture group had a significant decrease in median pain scores to 4.5. The control group, which had no intervention, showed almost no variation at a median score of 6 after 3 months. At 6 months, after the waiting list control group also received acupuncture treatment, the NRS in this group dropped to 3. The acupuncture group, which had received no treatment between 3 and 6 months had a slight increase in median pain perception to 5.

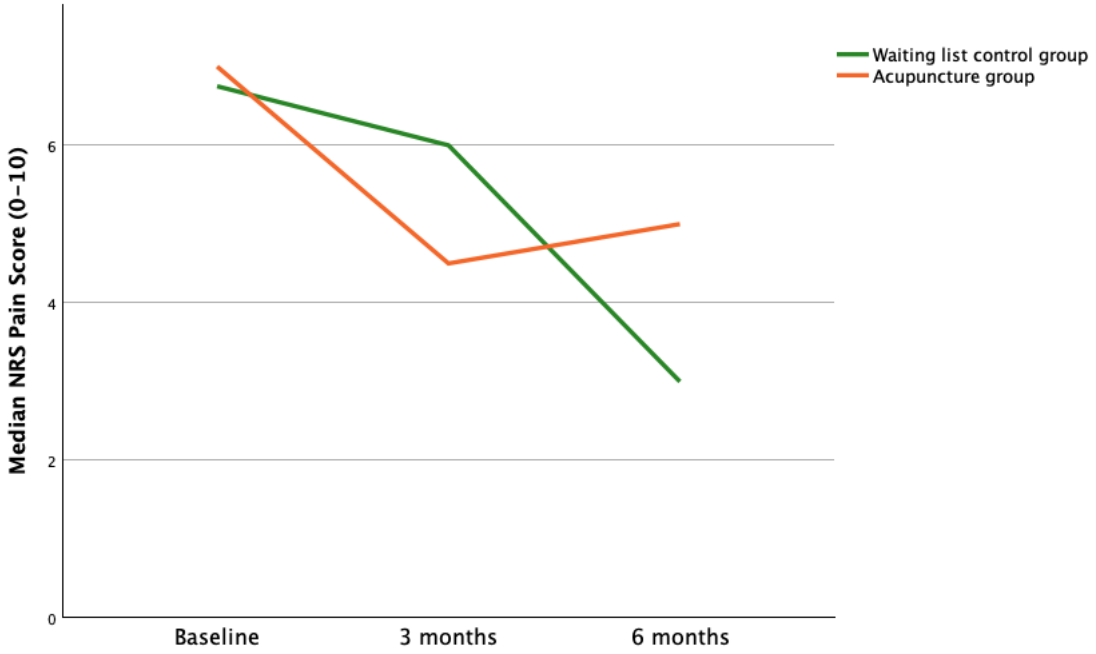


*Figure 8: Median NRS Pain Score of vulvar pain between baseline and 6 months*

### 3.6.2 Chronic pelvic pain

Chronic pelvic pain was assessed in 10 participants with the main diagnosis CPP (90.9%) at baseline and after 3 months - four in the waiting list control group and six in the acupuncture group. Data were missing for one patient at 3 and 6 months after the intervention due to loss to follow-up.

Participants receiving acupuncture showed a median reduction in subjective pain perception between baseline and three months of -3 on the NRS. In contrast, the waiting list control group experienced a slight increase with a median change of +1. The statistical comparison using a Mann-Whitney-U-Test showed no significant difference (p=0.1).

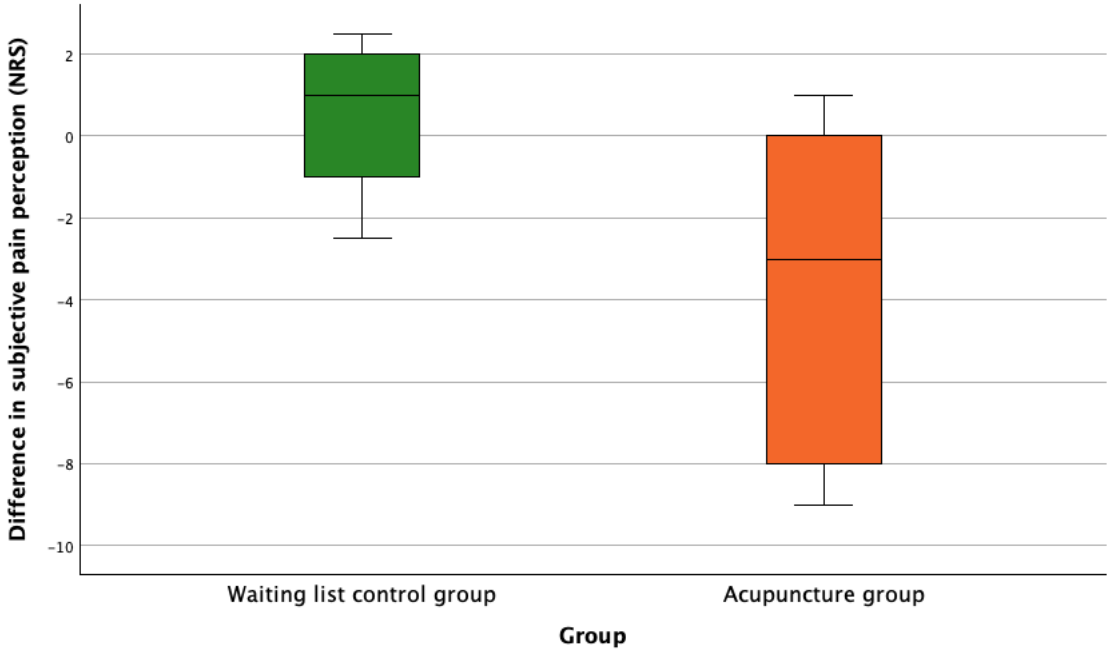


*Figure 9: Change in subjective pain perception of CPP between baseline and 3 months*

*Table 9: Descriptive Statistics of change in subjective pain perception of CPP*

| Group | n | Median Change | Mean Change | Standard deviation | Minimum | Maxi-mum | p-Value |
|---|---|---|---|---|---|---|---|
| Acupunc-ture group | 6 | -3 | -3.7 | 4.1 | -9 | 1 | 0.11 |
| Waiting list control group | 4 | 1 | -0.5 | 2.2 | -2.5 | 2.5 | |

The following graph shows the group median of subjective pain intensity (NRS 0-10) reported by participants at each time point. At baseline the median pain levels of the acupuncture group were 1 point higher on the NRS (Median: 6.25) than the waiting list control group (5.25). After 3 months, the pain scores of the acupuncture group had dropped to 3. The control group stayed at the same median pain score of 5.25. After 6 months the NRS of the waiting list control group also dropped to 2.75, while the acupuncture group still had a median pain perception of 3 on the numeric rating scale.

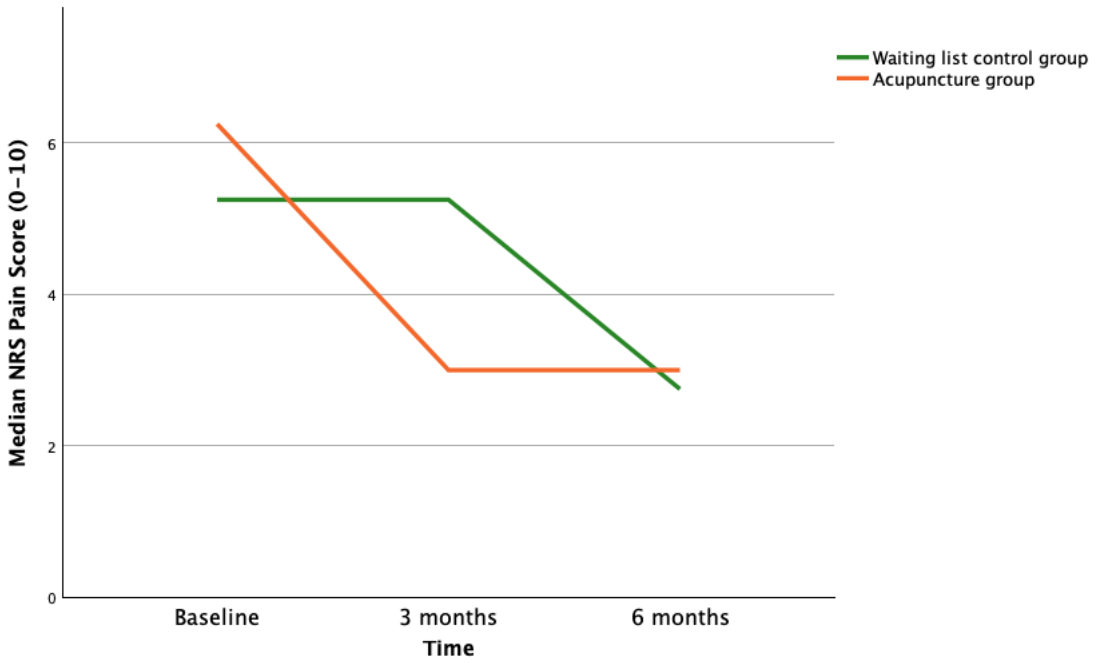


*Figure 10: Median NRS Pain Score between baseline and 6 months*

## *3.7 Concomitant pain symptoms*

### 3.7.1 Cotton Swab Test

A cotton swab test was carried out at baseline, after 3 and after 6 months.

At baseline and after 3 months the pain scales were assessed in a total of 17 women with a primary diagnosis of vulvodynia (73.9%). 11 were in the waiting list control group and 6 in the acupuncture group. The comparison between baseline and 3 months showed a median difference in the pain scales (NRS) of -2 in the acupuncture group and -1 in the waiting list control group.

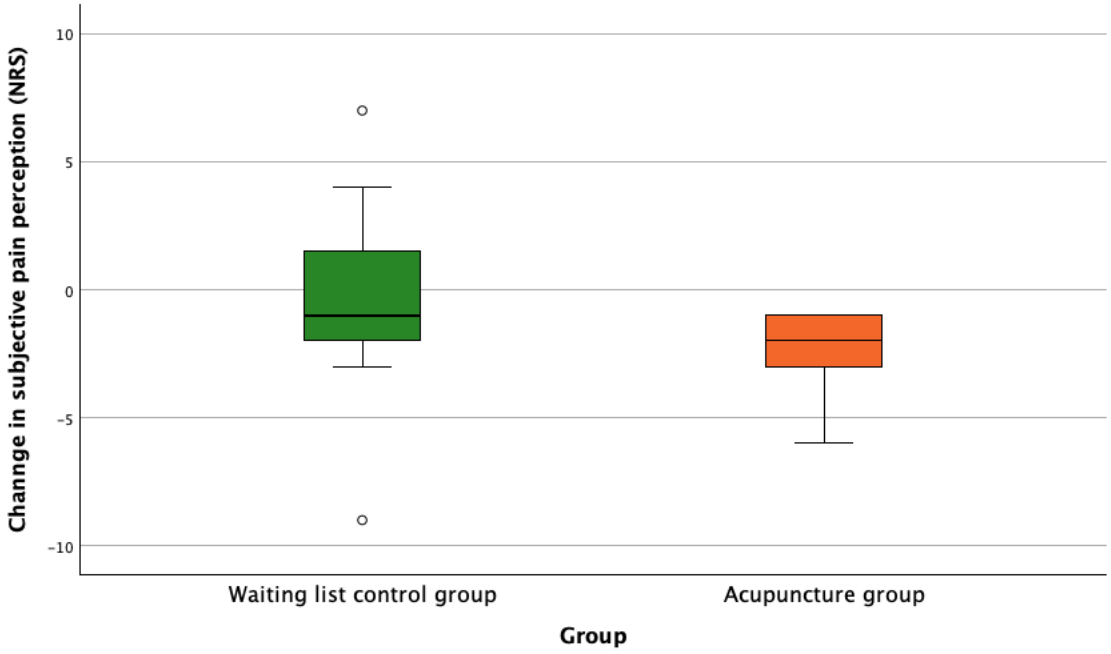


*Figure 11: Change in subjective pain perception using the cotton swab test between baseline and 3 months with a primary diagnosis of vulvodynia*

Also, the objective pain perception of the cotton swab test was assessed in a total of 17 women with a primary diagnosis of vulvodynia (73.9%). 10 were in the waiting list control group and 7 in the acupuncture group. The objective pain scores were measured from 0 to 3, 0 meaning no pain, 1 verbal pain, 2 grimace and 3 shrugging away.

The median change score between baseline and 3 months in the acupuncture group was -1. The median change score of the waiting list control group was 0.

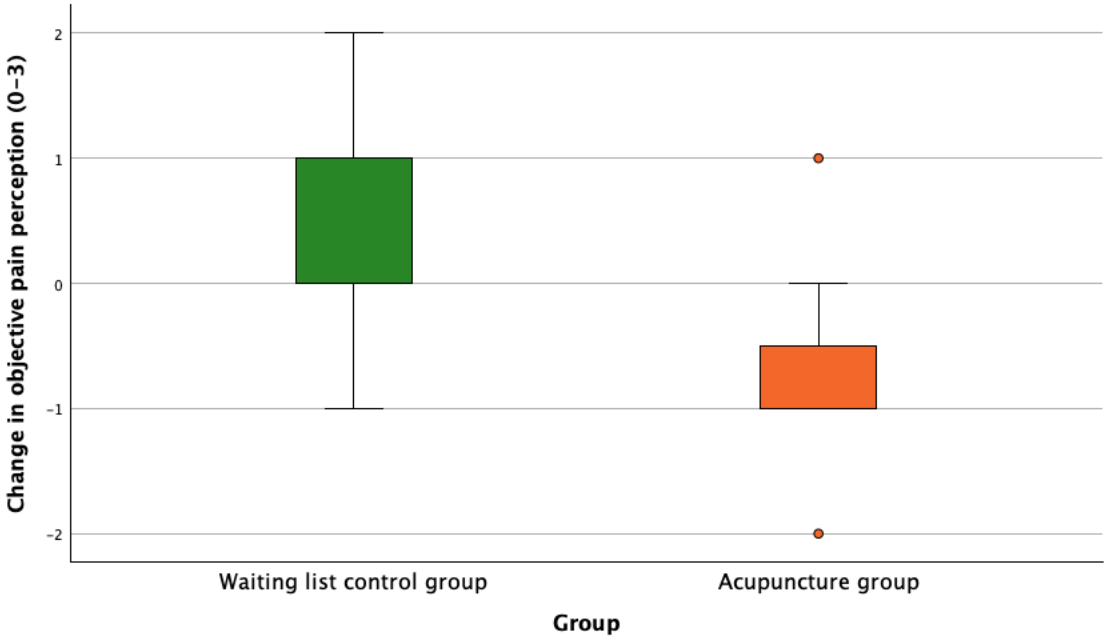


*Figure 12: Change in objective pain perception using cotton swab test*

### 3.7.2 Dyspareunia

Dyspareunia between baseline and 3 months was assessed in 11 participants (32.4%). 6 women were in the waiting list control group and 5 in the acupuncture group. The median change of subjective pain during intercourse was -2.5 in the acupuncture group and -0.5 in the waiting list control group.

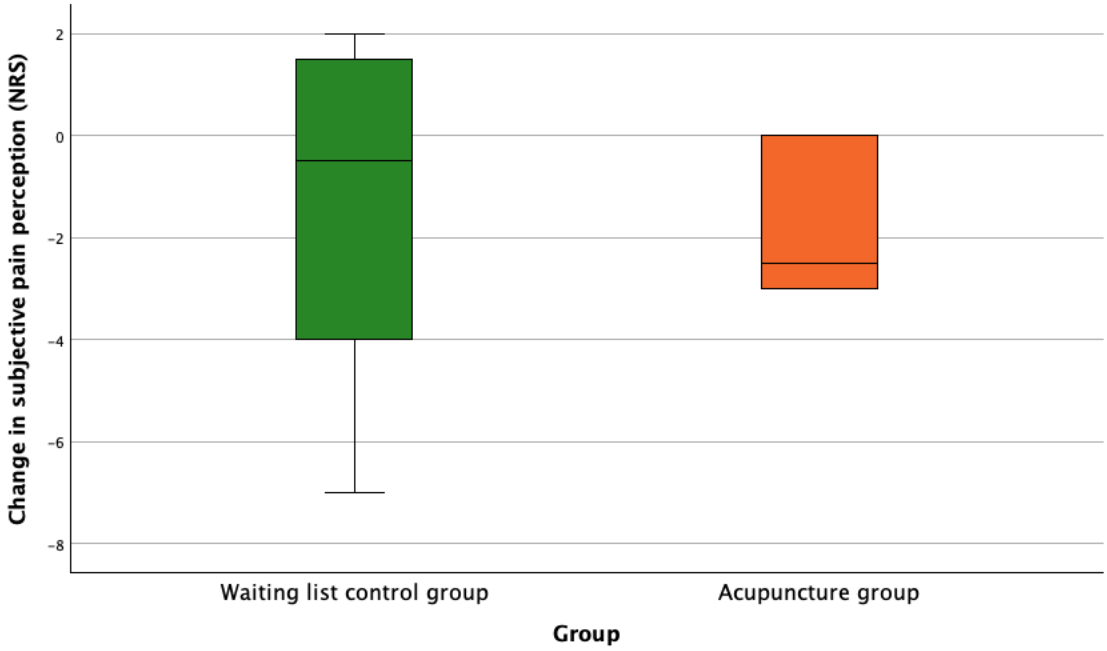


*Figure 13: Change in subjective pain perception of dyspareunia between baseline and 3 months*

### 3.7.3 Dysmenorrhea

The change in subjective pain perception of dysmenorrhea between baseline and 3 months was assessed of 16 participants (47.1%). 8 women were in the waiting list control group and 8 in acupuncture group. In the following boxplot the acupuncture group showed a bigger reduction in pain levels with median change score of -1 and a decrease in pain levels of up to 8 points on the NRS, while the waiting list control group had a median change scire of -0.5.

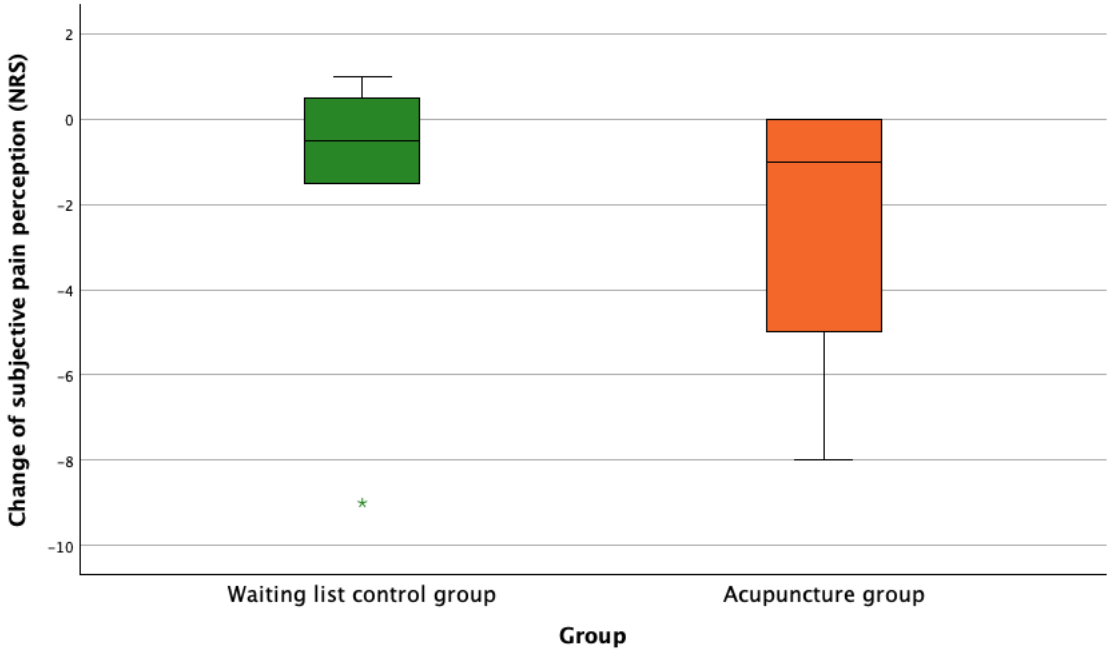


*Figure 14: Change in subjective pain perception of dysmenorrhea between baseline and 3 months*

### 3.7.4 Subjective Improvement

The Subjective Improvement has been assessed via a 7-point rating scale, also known as the “The Patient Global Impression of Improvement”. The subjective improvement of 15 women in the waiting list control group and 14 women in the acupuncture group was assessed at the 3-month-follow-up. 3 women felt very much better after receiving acupuncture treatment compared to 1 woman not receiving acupuncture in the waiting list control group. 4 women in the acupuncture group and 2 in the waiting list control group were feeling much better. 5 participants in each group said, they feel a little better.

3 women in the waiting list control group felt no change compared to 2 in the acupuncture group. No women in the acupuncture group felt a little worse to very much worse. 3 women in the waiting list control group felt a little worse and 1 much worse.

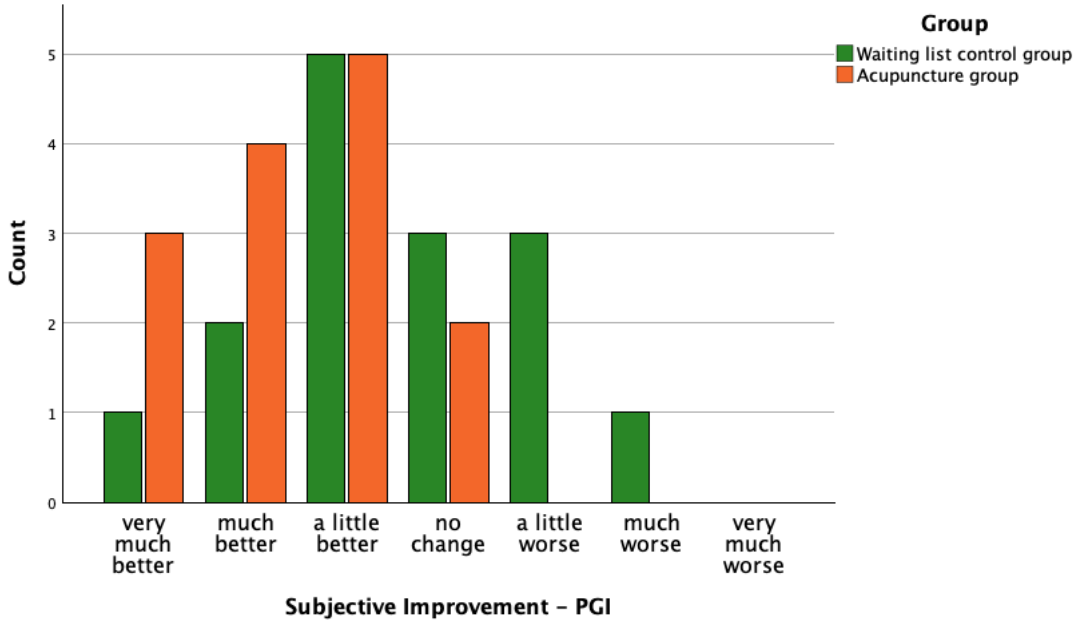


*Figure 15: Subjective Improvement between baseline and 3 months*

## *3.8 Questionnaires – Health related quality of life*

### 3.8.1 Endometriosis Health Profile Questionnaire (EHP-30)

The EHP-30 was fully completed by a total of 20 participants (58%) - 10 in the waiting list control group and 10 in the acupuncture group - at baseline and after 3 months. The mean change score in the waiting list control group was -3.56. In the acupuncture group the median change score was -11.60.

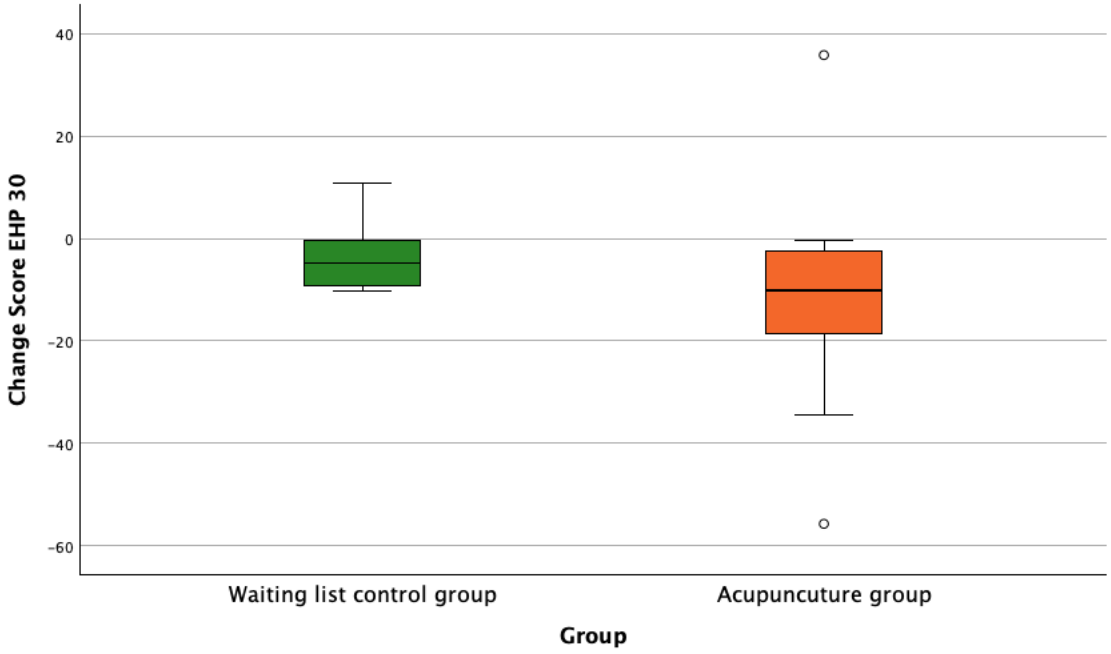


*Figure 16: Change of the EHP-30 Questionnaire between baseline and 3 months*

### 3.8.2 Pain Sensitivity Questionnaire (PSQ)

The Pain Sensitivity Questionnaire was fully completed by a total of 22 women (64.7%), 11 in each group, at baseline and at 3 months. The mean change score of the acupuncture group was -0.21 and 0.14 in the waiting list control group.

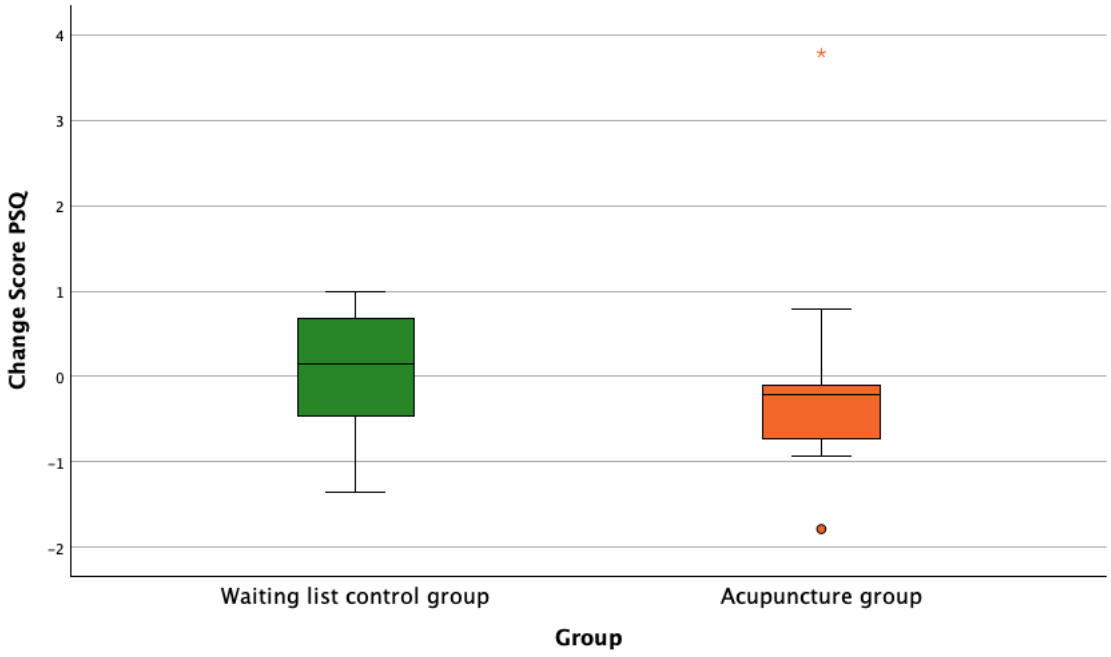


*Figure 17: Change of PSQ Questionnaire between baseline and 3 months*

### 3.8.3 Patient Health Questionnaire (PHQ-9)

The PHQ-9 was fully completed by a total of 20 women (58.8%) at baseline and after 3 months. 11 were in the waiting list control group and 9 in the acupuncture group. The median change score in the waiting list control group was 0. The acupuncture group had a median change score of -3.

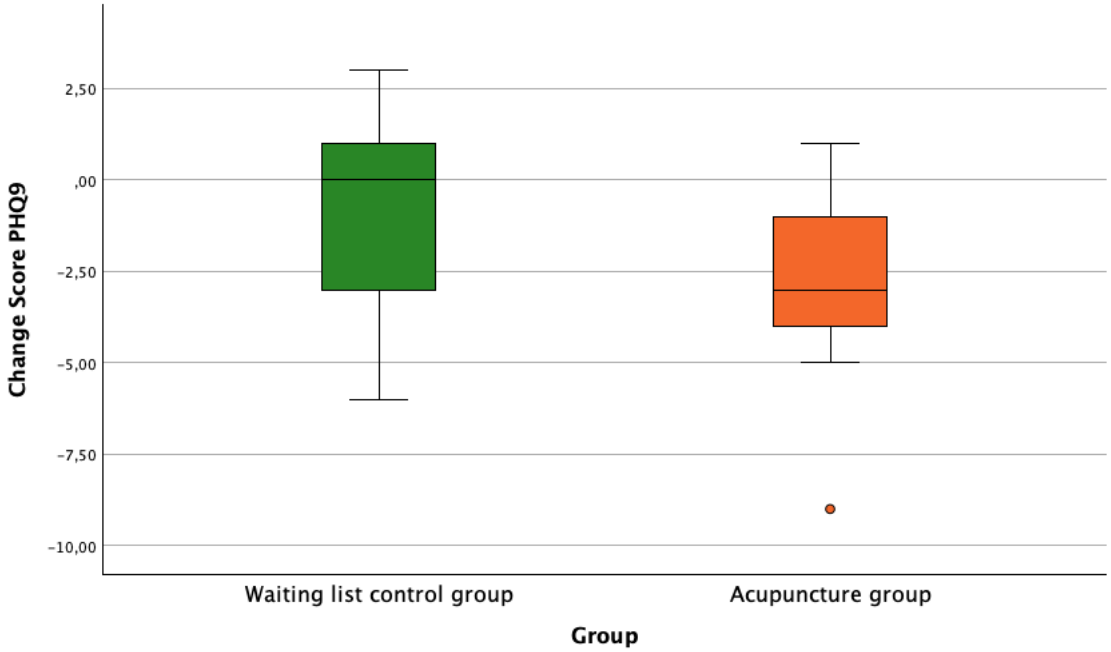


*Figure 18: Change of PHQ-9 Questionnaire between baseline and 3 months*

### 3.8.4 Female Sexual Function Index (FSFI)

The female sexual function index was assessed by a total of 25 women (73.5%) - 13 in the waiting list control group and 12 in the acupuncture group - at baseline and after 3 months. The waiting list control group had a median change score of -1.35 and the acupuncture group of -1.

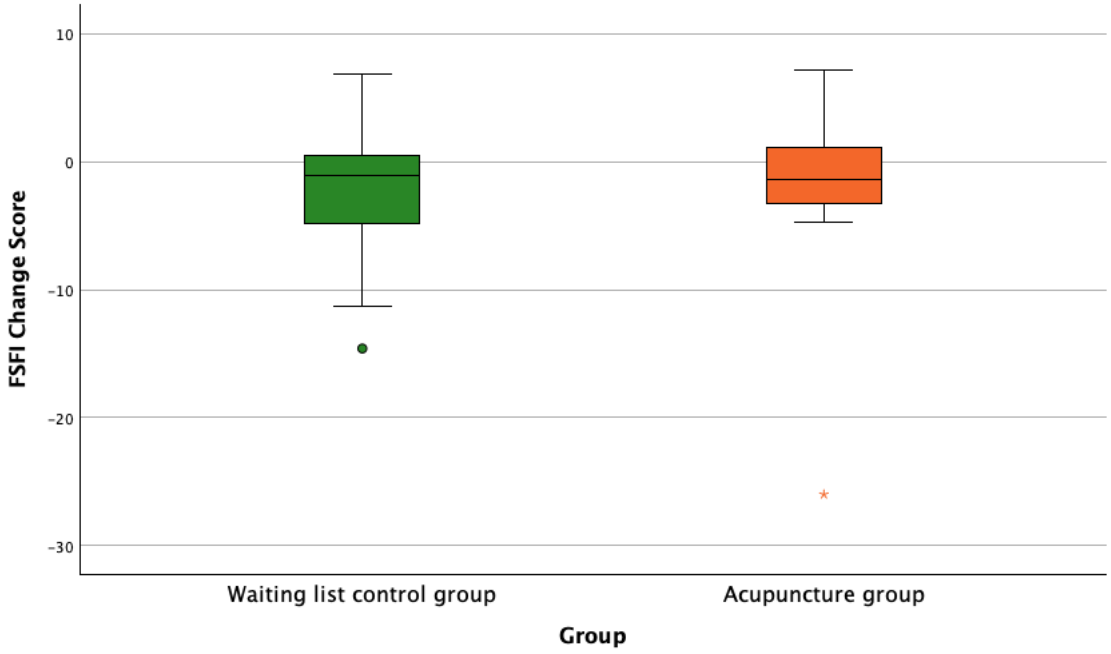


*Figure 19: Change of the Female Sexual Function Index between baseline and 3 months*

### 3.8.5 Client Satisfaction Questionnaire (ZUF8)

Nine women in the waiting list control group and 13 in the acupuncture group completed the client satisfaction questionnaire after 3 months.

After 3 months the client satisfaction was higher in the acupuncture group, with a mean value of 3.37 on a scale from 1 to 4. The mean satisfaction score in the waiting list control group was 2.96.

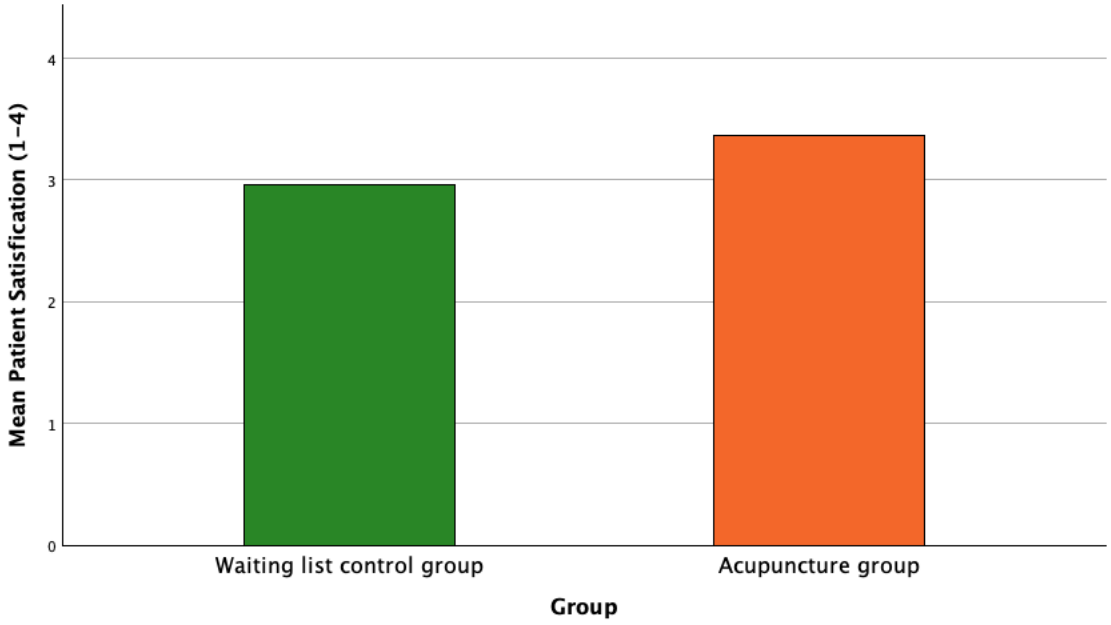


*Figure 20: Patient Satisfaction after 3 months*

# 4 Discussion

The aim of this randomized controlled trial was to analyse the efficacy of segmental acupuncture in a multidisciplinary approach in women with vulvodynia and chronic pelvic pain.

The results suggest that acupuncture may lead to improved outcome as part of a multidisciplinary approach for women with vulvodynia and chronic pelvic pain. However, we could not show a statistically significant difference between the study groups in terms of the reduction in subjective pain perception.

Women with chronic pelvic pain showed a greater response compared to those with vulvodynia. The median change score in participants with a primary diagnosis of CPP was -3 in the acupuncture group, while the control group had an increase in pain of +1 on the numeric rating scale after 3 months. In patients with vulvodynia the median change score was -0.5 in both groups.

In women with CPP, the effect of acupuncture maintained 3 months after the intervention, in comparison to the vulvodynia group, where the effect was less pronounced after 3 months.

Most of the secondary outcome measures trended towards improvement in the acupuncture group compared to the waiting list control group.

The cotton swab test in women with primary diagnosis of vulvodynia showed a reduction in both objective and subjective pain levels after acupuncture treatment. Subjective pain decreased by two points on the NRS after invention and only by one point in the control group. Objective pain was reduced by one point on a scale from 0-3 (0 = no pain to 3 = shrugging away) in the acupuncture group, while no change was observed in the waiting list control group.

Dyspareunia was also reduced following acupuncture treatment, with a difference of -2 on the NRS between the groups. A similar effect was observed for Dysmenorrhea.

Questionnaires on health-related quality of life also showed clinically relevant improvements in favour of acupuncture. The PHQ-9 decreased by 3 points in comparison to the control group, indicating a positive effect on mental health. The EHP-30 score decreased by 11.6 points in the acupuncture group compared to 3.56 points in the control group, reflecting an improvement in quality of life. Subjective Improvement, measured using the “Patient Global Impression of Improvement” scale, also showed a positive effect in favor of acupuncture. Improvement was reported more frequently by participants in the acupuncture group than by those in the waiting list control group.

Sexual function, measured by the FSFI, surprisingly decreased slightly in both groups, although the decrease was less in the acupuncture group (median change score: -1.0) compared to the waiting list control group (median change score: -1.35). The Satisfaction Questionnaire assessed after 3 months indicated a slightly higher satisfaction in the acupuncture group (3.37 on a scale from 1-4) compared to the waiting list control group (2.96). The higher satisfaction could be related to the fact that the waiting list control group had not yet received acupuncture treatment at the 3 month-follow-up.

## *4.1 Comparison of results with literature*

A review of the literature showed that there is only one other randomized controlled trial that has studied the efficacy of acupuncture for the treatment of vulvodynia. Schlaeger et al. randomized 36 patients to either an acupuncture group or a wait-list control group. The acupuncture group received acupuncture two times per week for a total of ten sessions. Pain scores were evaluated using the SF-MPQ (Short-form McGill Pain Questionnaire), while sexual function was measured using the FSFI. The results showed a significant reduction in vulvar pain and dyspareunia in the acupuncture group. (68) The findings of this diploma thesis were not in line with those of the study mentioned above, as there was no significant difference between the two groups, and the pain difference remained similar. However, as our study investigated chronic pelvic pain and vulvodynia, the vulvodynia group was smaller than in the bespoke study, and the acupuncture protocols didn’t exclusively focus on vulvodynia, which may have reduced the specificity for the treatment of vulvar pain. Additionally, the study by Schlaeger et

al. excluded patients with interstitial cystitis, menopause, irritable bowel syndrome, vaginitis, pelvic inflammatory disease, or any other pelvic pathology causing pain. This naturally excludes many women, as these conditions are often chronic and frequently occur together. In our study, the number of comorbidities was high: 13 women suffered from painful bladder syndrome, eight from recurrent cystitis and five from irritable bowel syndrome, and many others. Another difference was the shorter timeframe of the study by Schlaeger et at., which could have affected the treatment response. The higher frequency potentially made the treatment more effective, explaining the better response to therapy. However, the long-term effect was not measured.

The quality of life after acupuncture treatment for vulvodynia was measured in a study by Danielsson et al, however, this study was neither randomized nor controlled. Thirteen participants received ten acupuncture treatments, at one- or two-weekly intervals. Quality of life was measured using a VAS scale, with three patient-defined negative factors and two predefined positive factors, which were evaluated at baseline, after treatment and three months after the treatment. Significant improvements in quality of life were observed at all three follow-ups. (75) These findings are consistent with the results from the Amalia study, as we also observed improvements in health-related quality of life questionnaires.

The literature on the effect of acupuncture on chronic pelvic pain is not homogenous, as the term is often interpreted in different ways. Many studies on acupuncture for chronic pelvic pain also include men with chronic prostatitis, while other studies focusing solely on women often exclude those with certain pathologies, such as endometriosis. Therefore, it is difficult to draw comparisons between results. In our study, however, all women with chronic pelvic pain were included.

A systematic review and meta-analysis of randomized controlled trials evaluating acupuncture for chronic pelvic pain in women, including four RCTs with a total of 474 patients, showed, that a treatment effect is suggested. However, the current evidence is not enough to verify the efficacy, due to a lack of methodological quality and the small number of RCTs. Also, the included studies were very

heterogenous and therefore not comparable enough. Women with endometriosis were excluded from the review and meta-analysis. (76)

A systematic review and meta-analysis by Chen et al. solely evaluated the efficacy of acupuncture in endometriosis-related pain. A total of 14 RCTs were included in the study. The findings aligned with ours, that acupuncture reduced pain levels, as well as dysmenorrhea. However, the acupuncture methods were very heterogenous, including acupuncture, electroacupuncture, auricular acupuncture, fire needling, and warm needling. (77)

## *4.2 Clinical implications*

Overall, it can be said that most of the patients had a combination of vulvodynia and CPP, and therefore the results cannot be strictly separated. Both conditions are generally very complex, going hand in hand with a high number of comorbidities that lead to a limited quality of life. Therefore, a positive impact on general well-being, as we were able to demonstrate with the questionnaires on quality of life, is a significant step towards improving a disease that often encompasses more than just pain in the vulva or lower abdomen. Therefore, acupuncture therapy can be recommended to patients for the treatment of vulvodynia and CPP. However, they should be informed that the effect of acupuncture on general well-being and the concomitant pain symptoms may be more significant than its effect on localised pain.

## *4.3 Strengths and limitations*

The Amalia study is the first to investigate the effectiveness of acupuncture in women with vulvodynia and chronic pelvic pain in a combined, multidisciplinary context. In previous studies, the two conditions were studied separately. This study addressed a scarcely investigated topic and obtained relevant data for further therapeutic options in both conditions. Since the study included not only pain measurement and sexual functioning, but also assessment of health-related quality of life using standardized questionnaires, allowing for a comprehensive evaluation of patient reported-outcomes. The standardized acupuncture treatment

via protocol with predefined acupuncture points allowed a good comparison between the subgroups and increased reproducibility.

The study has several limitations. The biggest limitation of this pre-evaluation of the Amalia study was the sample size, as it only included half of the calculated number of participants. A more definite result with less chance of type 1 errors can be expected from the final version including 68 patients. The fact that the study was not double blinded limits the quality of the study. The use of sham acupuncture, which is a method to double-blind acupuncture studies by inserting needles in non-acupuncture points on the body, was not part of this study, as there are studies that suggest that these points can also have a non-specific effect that can contribute to the analgesic effect of acupuncture. (78)

Furthermore, the surrounding circumstances that can influence the effectiveness of the treatment must also be considered. These include the patients' positive expectations of the treatment, the therapeutic interaction and interdisciplinary support. Studies conducted with sham acupuncture cannot eliminate these effects either as it is impossible to create a setting in which they cannot occur.

Additionally, there might have been an influence on the results by the unequal distribution into the study groups in the subgroup of vulvodynia. In that group, 11 participants were in the waiting list control group and only 7 were in the acupuncture group. This reduces the ability to compare the groups. Another limiting factor was missing data, as some women were lost to follow up, did not attend every follow-up or discontinued the study. In some cases, the self-administered questionnaires were returned incomplete and could not be evaluated. As a result, it was not possible to include all participants in the statistical analysis, which affected the reliability of the results.

When performing future trials in this field, a multi-centred approach might be considered, to increase sample size, reduce bias and increase generalizability.

# 5 Conclusio

In summary, this study evaluated the effect of acupuncture in a multimodal treatment approach on women affected by vulvodynia and chronic pelvic pain.

Results showed a positive effect on chronic pelvic pain, though the pain perception in women with vulvodynia only changed minimally. Overall, pain scores for dysmenorrhea and dyspareunia decreased, and health-related quality of life improved. However, a relevant improvement in sexual function was not observed.

The findings for chronic pelvic correlated with recent literature, while the results for vulvodynia differed from those of recent studies.

The results were not statistically significant. The main limitation and possible cause of this lower statistical power was the small sample size, as this diploma thesis was a pre-evaluation of a larger trial (Amalia study), including only half of the planned sample size.

Despite these limitations, this diploma thesis showed that acupuncture in a multidisciplinary approach could be a promising complementary treatment option for treating chronic pelvic pain and vulvodynia, particularly regarding general well-being and concomitant pain symptoms.

It can be expected that the final evaluation of the Amalia study, incorporating all study data and a larger sample size, will provide further insights into the effectiveness of acupuncture as part of a multidisciplinary approach. In the long term, these results could contribute to improving the treatment and quality of life of women with vulvodynia and CPP.

# References


1. Bornstein J, Goldstein AT, Stockdale CK, Bergeron S, Pukall C, Zolnoun D, Coady D; consensus vulvar pain terminology committee of the International Society for the Study of Vulvovaginal Disease (ISSVD), the International Society for the Study of Women's Sexual Health (ISSWSH), and the International Pelvic Pain Society (IPPS). 2015 ISSVD, ISSWSH and IPPS Consensus Terminology and Classification of Persistent Vulvar Pain and Vulvodynia. Obstet Gynecol. 2016 Apr;127(4):745-751.
2. Sadownik LA. Etiology, diagnosis, and clinical management of vulvodynia. Int J Womens Health. 2014 May 2;6:437-49
3. Harlow BL, Kunitz CG, Nguyen RHN, Rydell SA, Turner RM, Maclehose RF. Prevalence of Symptoms Consistent with a Diagnosis of Vulvodynia: Population-based estimates from two geographical regions. Am J Obstet Gynecol. 2014;210(1):40.e1-40.e8.
4. Reed BD, Harlow SD, Sen A, Legocki LJ, Edwards RM, Arato N, et al. Prevalence and demographic characteristics of vulvodynia in a population-based sample. Am J Obstet Gynecol. 2012;206(2).
5. Harlow BL, Wise LA, Stewart EG. Prevalence and predictors of chronic lower genital tract discomfort. Am J Obstet Gynecol. 2001;185(3).
6. Pukall CF, Goldstein AT, Bergeron S, Foster D, Stein A, Kellogg-Spadt S, et al. Vulvodynia: Definition, Prevalence, Impact, and Pathophysiological Factors. Journal of Sexual Medicine. 2016;13(3).
7. Bergeron S, Reed BD, Wesselmann U, Bohm-Starke N. Vulvodynia. Nat Rev Dis Primers. 2020 Apr 30;6(1):36
8. Bohm-Slarke N, Hiliges M, Falconer C, Rylander E. Increased intraepithelial innervation in women with vulvar vestibulitis syndrome. Gynecol Obstet Invest. 1998;46(4).
9. Pukall CF, Binik YM, Khalifé S, Amsel R, Abbott FV. Vestibular tactile and pain thresholds in women with vulvar vestibulitis syndrome. Pain. 2002 Mar;96(1-2):163-75
10. Giesecke J, Reed BD, Haefner HK, Giesecke T, Clauw DJ, Gracely RH. Quantitative sensory testing in vulvodynia patients and increased peripheral pressure pain sensitivity. Obstetrics and Gynecology. 2004;104(1).
11. Reed BD, Harlow SD, Sen A, Edwards RM, Chen D, Haefner HK. Relationship between vulvodynia and chronic comorbid pain conditions. Obstetrics and Gynecology. 2012;120(1).
12. Pyka RE, Wilkinson EJ, Friedrich EG, Croker BP. The histopathology of vulvar vestibulitis syndrome. International Journal of Gynecological Pathology. 1988;7(3).
13. Chalmers KJ, Madden VJ, Hutchinson MR, Moseley GL. Local and Systemic Inflammation in Localized, Provoked Vestibulodynia: A Systematic Review. Obstet Gynecol. 2016 Aug;128(2):337-47.
14. Morgan TK, Allen-Brady KL, Monson MA, Leclair CM, Sharp HT, Cannon-Albright LA. Familiality analysis of provoked vestibulodynia treated by vestibulectomy supports genetic predisposition. Am J Obstet Gynecol. 2016;214(5).

15. Lev-Sagie A, Prus D, Linhares IM, Lavy Y, Ledger WJ, Witkin SS. Polymorphism in a gene coding for the inflammasome component NALP3 and recurrent vulvovaginal candidiasis in women with vulvar vestibulitis syndrome. Am J Obstet Gynecol. 2009;200(3).
16. Gerber S, Bongiovanni AM, Ledger WJ, Witkin SS. Interleukin-1β gene polymorphism in women with vulvar vestibulitis syndrome. European Journal of Obstetrics and Gynecology and Reproductive Biology. 2003;107(1).
17. Goldstein AT, Belkin ZR, Krapf JM, Song W, Khera M, Jutrzonka SL, et al. Polymorphisms of the androgen receptor gene and hormonal contraceptive induced provoked vestibulodynia. Journal of Sexual Medicine. 2014;11(11).
18. Ting AY, Blacklock AD, Smith PG. Estrogen regulates vaginal sensory and autonomic nerve density in the rat. Biol Reprod. 2004;71(4).
19. Harlow BL, Vitonis AF, Stewart EG. Influence of oral contraceptive use on the risk of adult-onset vulvodynia. Journal of Reproductive Medicine for the Obstetrician and Gynecologist. 2008 Feb;53(2):102–10.
20. Wesselmann U, Bonham A, Foster D. Vulvodynia: Current state of the biological science. Pain. 2014 Sep;155(9):1696-1701.
21. Morin M, Binik YM, Bourbonnais D, Khalifé S, Ouellet S, Bergeron S. Heightened Pelvic Floor Muscle Tone and Altered Contractility in Women With Provoked Vestibulodynia. Journal of Sexual Medicine. 2017;14(4).
22. Desrochers G, Bergeron S, Landry T, Jodoin M. Do psychosexual factors play a role in the etiology of provoked vestibulodynia? A critical review. J Sex Marital Ther. 2008;34(3).
23. Harlow BL, Stewart EG. Adult-onset vulvodynia in relation to childhood violence victimization. Am J Epidemiol. 2005;161(9).
24. Khandker M, Brady SS, Stewart EG, Harlow BL. Is chronic stress during childhood associated with adult-onset vulvodynia? J Womens Health. 2014;23(8).
25. Eppsteiner E, Boardman L, Stockdale CK. Vulvodynia. Best Pract Res Clin Obstet Gynaecol. 2014 Oct 1;28(7):1000–12.
26. Sadownik LA. Etiology, diagnosis, and clinical management of vulvodynia. Int J Womens Health [Internet]. 2014 May 2 [cited 2024 Oct 9];6(1):437–49. Available from: https://pubmed.ncbi.nlm.nih.gov/24833921/
27. Goldstein AT, Pukall CF, Brown C, Bergeron S, Stein A, Kellogg-Spadt S. Vulvodynia: Assessment and Treatment. Journal of Sexual Medicine. 2016 Apr 1;13(4):572–90.
28. Spoelstra SK, Dijkstra JR, Van Driel MF, Weijmar Schultz WCM. Long-Term Results of an Individualized, Multifaceted, and Multidisciplinary Therapeutic Approach to Provoked Vestibulodynia. Journal of Sexual Medicine. 2011;8(2).
29. 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 [Internet]. 2016 Mar 1 [cited 2024 Oct 9];84(3):259–68. Available from: https://pubmed.ncbi.nlm.nih.gov/26727408/
30. Morin M, Dumoulin C, Bergeron S, Mayrand MH, Khalifé S, Waddell G, et al. Randomized clinical trial of multimodal physiotherapy treatment compared to overnight lidocaine ointment in women with provoked vestibulodynia: Design and methods. Contemp Clin Trials. 2016 Jan 1;46:52–9.

31. Morin M, Dumoulin C, Bergeron S, Mayrand MH, Khalifé S, Waddell G, et al. Multimodal physical therapy versus topical lidocaine for provoked vestibulodynia: a multicenter, randomized trial. Am J Obstet Gynecol. 2021 Feb 1;224(2):189.e1-189.e12.
32. Haefner HK, Collins ME, Davis GD, Edwards L, Foster DC, Hartmann ED, Kaufman RH, Lynch PJ, Margesson LJ, Moyal-Barracco M, Piper CK, Reed BD, Stewart EG, Wilkinson EJ. The vulvodynia guideline. J Low Genit Tract Dis. 2005 Jan;9(1):40-51.
33. Schlaeger JM, Glayzer JE, Villegas-Downs M, Li H, Glayzer EJ, He Y, Takayama M, Yajima H, Takakura N, Kobak WH, McFarlin BL. Evaluation and Treatment of Vulvodynia: State of the Science. J Midwifery Womens Health. 2023 Jan;68(1):9-34.
34. Spoelstra SK, Borg C, Weijmar Schultz WCM. Anticonvulsant pharmacotherapy for generalized and localized vulvodynia: a critical review of the literature. Journal of Psychosomatic Obstetrics & Gynecology [Internet]. 2013 Sep [cited 2024 Oct 12];34(3):133–8. Available from: https://www.tandfonline.com/doi/abs/10.3109/0167482X.2013.823942
35. Coryn N, Vergauwe B, Weyers S, Verstraelen H. Long-Term Effectiveness of Vestibulectomy for the Treatment of Vulvodynia: A Retrospective Cohort Study. J Low Genit Tract Dis [Internet]. 2024 Jul 1 [cited 2024 Oct 12];28(3):258–63. Available from: https://journals.lww.com/jlgtd/fulltext/2024/07000/long_term_effectiveness_of_vestibulectomy_for_the.8.aspx
36. Williams RE, Hartmann KE, Steege JF. Documenting the current definitions of chronic pelvic pain: implications for research. Obstet Gynecol. 2004 Apr;103(4):686-91.
37. Lamvu G, Carrillo J, Ouyang C, Rapkin A. Chronic Pelvic Pain in Women: A Review. JAMA. 2021 Jun 15;325(23):2381-2391.
38. Ahangari A. Prevalence of chronic pelvic pain among women: An updated review. Pain Physician. 2014;17(2).
39. Husby GK, Haugen RS, Moen MH. Diagnostic delay in women with pain and endometriosis. Acta Obstet Gynecol Scand. 2003;82(7).
40. Deutsche Gesellschaft für Psychosomatische Frauenheilkunde und Geburtshilfe. Chronischer Unterbauchschmerz der Frau. Version 5.0. Nov 2022. Available from: https://register.awmf.org/assets/guidelines/016-001l_S2k_Chronischer_Unterbauchschmerz_Frau_2023-04.pdf
41. Saunders PTK, Horne AW. Endometriosis: Etiology, pathobiology, and therapeutic prospects. Cell. 2021 May 27;184(11):2807–24.
42. Shafrir AL, Farland L V., Shah DK, Harris HR, Kvaskoff M, Zondervan K, et al. Risk for and consequences of endometriosis: A critical epidemiologic review. Best Pract Res Clin Obstet Gynaecol [Internet]. 2018 Aug 1 [cited 2024 Apr 5];51:1–15. Available from: https://pubmed.ncbi.nlm.nih.gov/30017581/
43. Zondervan KT, Becker CM, Missmer SA. Endometriosis. Longo DL, editor. New England Journal of Medicine [Internet]. 2020 Mar 26 [cited 2024 Apr 5];382(13):1244–56. Available from: https://www.nejm.org/doi/full/10.1056/NEJMra1810764
44. Deutsche Gesellschaft für Urologie e.V. S2k-Leitlinie Diagnostik und Therapie der Interstitiellen Zystitis (IC/BPS). Version 2.0. Sep 2024.

Available from: https://register.awmf.org/assets/guidelines/043-050l_S2k_Diagnostik-Therapie-Interstitielle-Zystitis-IC-BPS_2025-07.pdf
45. Adamyan L V., Sonova MM, Arslanyan KN, Loginova N. The role of cytokines in the clinical presentation of external genital endometriosis and chronic pelvic pain. Voprosy Ginekologii, Akusherstva i Perinatologii. 2020;19(1):5–11.
46. Matsuda M, Huh Y, Ji RR. Roles of inflammation, neurogenic inflammation, and neuroinflammation in pain. J Anesth [Internet]. 2019 Feb 20 [cited 2024 Apr 5];33(1):131–9. Available from: https://pubmed.ncbi.nlm.nih.gov/30448975/
47. Velho RV, Taube E, Sehouli J, Mechsner S, Laganà S, Hayashi K. Molecular Sciences Neurogenic Inflammation in the Context of Endometriosis-What Do We Know? J Mol Sci [Internet]. 2021 [cited 2024 Apr 2];22:13102. Available from: https://doi.org/10.3390/ijms222313102
48. Brawn J, Morotti M, Zondervan KT, Becker CM, Vincent K. Central changes associated with chronic pelvic pain and endometriosis. Hum Reprod Update. 2014;20(5):737–47.
49. Stratton P, Khachikyan I, Sinaii N, Ortiz R, Shah J. Association of chronic pelvic pain and endometriosis with signs of sensitization and myofascial pain. Obstetrics and gynecology [Internet]. 2015 Mar 27 [cited 2024 Apr 5];125(3):719–28. Available from: https://pubmed.ncbi.nlm.nih.gov/25730237/
50. Aredo J V, Heyrana KJ, Karp BI, Shah JP, Stratton P, Reprod S, et al. Relating Chronic Pelvic Pain and Endometriosis to Signs of Sensitization and Myofascial Pain and Dysfunction HHS Public Access Author manuscript. Semin Reprod Med. 2017;35(1):88–97.
51. Latthe P, Mignini L, Gray R, Hills R, Khan K. Factors predisposing women to chronic pelvic pain: systematic review. BMJ [Internet]. 2006 Apr 1 [cited 2024 Apr 2];332(7544):749–51. Available from: https://pubmed.ncbi.nlm.nih.gov/16484239/
52. Chronic Pelvic Pain: ACOG Practice Bulletin, Number 218. Obstet Gynecol. 2020 Mar;135(3):e98-e109.
53. Siqueira-Campos VM, Campos de Deus MS, Poli-Neto OB, Rosa-E-silva JC, de Deus JM, Conde DM. Current Challenges in the Management of Chronic Pelvic Pain in Women: From Bench to Bedside. Int J Womens Health [Internet]. 2022 [cited 2024 Apr 9];14:225. Available from: /pmc/articles/PMC8863341/
54. Peters AAW, van Dorst E, Jellis B, van Zuuren E, Hermans J, Trimbos JB. A randomized clinical trial to compare two different approaches in women with chronic pelvic pain. Obstetrics and Gynecology [Internet]. 1991 [cited 2024 Apr 8];77(5):740–4. Available from: https://www.researchgate.net/publication/21328525_A_randomized_clinical_trial_to_compare_two_different_approaches_in_women_with_chronic_pelvic_pain
55. Klotz SGR, Schön M, Ketels G, Löwe B, Brünahl CA. Physiotherapy management of patients with chronic pelvic pain (CPP): A systematic review. Physiother Theory Pract [Internet]. 2019 Jun 3 [cited 2024 Apr 8];35(6):516–32. Available from: https://www.tandfonline.com/doi/abs/10.1080/09593985.2018.1455251

56. Fan XM, Ren YF, Fu X, Wu H, Ye X, Jiang YF, et al. Gabapentin has Longer-Term Efficacy for the Treatment of Chronic Pelvic Pain in Women: A Systematic Review and Pilot Meta-analysis. Pain Ther [Internet]. 2021 Dec 1 [cited 2024 Apr 8];10(2):1673–89. Available from: https://pubmed.ncbi.nlm.nih.gov/34606030/
57. Valentine LN, Deimling TA. Opioids and Alternatives in Female Chronic Pelvic Pain. Semin Reprod Med [Internet]. 2018 [cited 2024 Apr 8];36(2):164–71. Available from: https://pubmed.ncbi.nlm.nih.gov/30566983/
58. Römer A, editor. Akupunktur für Hebammen, Geburtshelfer und Gynäkologen. Stuttgart; New York: Georg Thieme Verlag; 2018.
59. Tang JL, Liu BY, Ma KW. Traditional Chinese medicine. The Lancet [Internet]. 2008 Jun 12 [cited 2024 Oct 6];372(9654):1938–40. Available from: http://www.thelancet.com/article/S0140673608613549/fulltext
60. Kubiena G. Praxishandbuch Akupunktur. München: Elsevier; 2007.
61. Wancura-Kampik I. Segment-Anatomie . München: Elsevier (Urban&Fisher); 2022.
62. He T, Zhu W, Du SQ, Yang JW, Li F, Yang BF, et al. Neural mechanisms of acupuncture as revealed by fMRI studies. Autonomic Neuroscience. 2015 Jul 1;190:1–9.
63. Baeumler PI, Fleckenstein J, Takayama S, Simang M, Seki T, Irnich D. Effects of Acupuncture on Sensory Perception: A Systematic Review and Meta-Analysis. PLoS One [Internet]. 2014 Dec 12 [cited 2024 Apr 12];9(12). Available from: /pmc/articles/PMC4264748/
64. Vickers AJ, Vertosick EA, Lewith G, MacPherson H, Foster NE, Sherman KJ, et al. Critical Reviews Acupuncture for Chronic Pain: Update of an Individual Patient Data Meta-Analysis. J Pain [Internet]. 2017 [cited 2024 Apr 10];19(5):455–74. Available from: www.jpain.organdwww.sciencedirect.com.www.jpain.organdwww.sciencedirect.com
65. Lin KYH, Chang YC, Lu WC, Kotha P, Chen YH, Tu CH. Analgesic Efficacy of Acupuncture on Chronic Pelvic Pain: A Systemic Review and Meta-Analysis Study. Healthcare 2023, Vol 11, Page 830 [Internet]. 2023 Mar 11 [cited 2024 Apr 12];11(6):830. Available from: https://www.mdpi.com/2227-9032/11/6/830/htm
66. Armour M, Cave AE, Schabrun SM, Steiner GZ, Zhu X, Song J, et al. Manual Acupuncture Plus Usual Care Versus Usual Care Alone in the Treatment of Endometriosis-Related Chronic Pelvic Pain: A Randomized Controlled Feasibility Study. J Altern Complement Med [Internet]. 2021 Oct 1 [cited 2024 Apr 12];27(10):841–9. Available from: https://pubmed.ncbi.nlm.nih.gov/34161143/
67. Shetty GB, Shetty B, Mooventhan A. Efficacy of Acupuncture in the Management of Primary Dysmenorrhea: A Randomized Controlled Trial. J Acupunct Meridian Stud. 2018 Aug 1;11(4):153–8.
68. Schlaeger JM, Xu N, Mejta CL, Park CG, Wilkie DJ. Acupuncture for the treatment of vulvodynia: a randomized wait-list controlled pilot study. J Sex Med [Internet]. 2015 Apr 1 [cited 2024 Apr 12];12(4):1019–27. Available from: https://pubmed.ncbi.nlm.nih.gov/25639289/
69. ClinicalTrials.gov [Internet]. Bethesda (MD): National Library of Medicine (US). 2000 Feb 29 - . Identifier NCT05324280, Acupuncture in a

Multidisciplinary Approach for Vulvodynia and Chronic Pelvic Pain (AMALIA); 2022 Apr 4 [cited 2025 Jun 24]. Available from: https://clinicaltrials.gov/study/NCT05324280
70. MacPherson H, Altman DG, Hammerschlag R, Youping L, Taixiang W, White A, Moher D; STRICTA Revision Group. Revised STandards for Reporting Interventions in Clinical Trials of Acupuncture (STRICTA): Extending the CONSORT statement. J Evid Based Med. 2010 Aug;3(3):140-55.
71. Jones GL, Budds K, Taylor F, Musson D, Raymer J, Churchman D, et al. A systematic review to determine use of the Endometriosis Health Profiles to measure quality of life outcomes in women with endometriosis. Hum Reprod Update [Internet]. 2024 Mar 1 [cited 2024 Oct 15];30(2):186–214. Available from: https://dx.doi.org/10.1093/humupd/dmad029
72. Meston CM, Freihart BK, Handy AB, Kilimnik CD, Rosen RC. Scoring and Interpretation of the FSFI: What can be Learned From 20 Years of use? J Sex Med. 2020 Jan 1;17(1):17–25.
73. Schoenthaler M, Farin E, Karcz WK, Ardelt P, Wetterauer U, Miernik A. Der Freiburger Index für Patientenzufriedenheit. DMW - Deutsche Medizinische Wochenschrift [Internet]. 2012 [cited 2024 Oct 20];137(09):419–24. Available from: http://www.thieme-connect.com/products/ejournals/html/10.1055/s-0031-1298976
74. Stijic M, Messerer B, Meißner W, Avian A. Numeric rating scale for pain should be used in an ordinal but not interval manner. A retrospective analysis of 346,892 patient reports of the quality improvement in postoperative pain treatment registry. Pain [Internet]. 2024 Mar 1 [cited 2025 Oct 6];165(3):707–14. Available from: https://pubmed.ncbi.nlm.nih.gov/37851363/
75. Danielsson I, Sjöberg I, Ostman C. Acupuncture for the treatment of vulvar vestibulitis: a pilot study. Acta Obstet Gynecol Scand. 2001 May;80(5):437-41
76. Sung SH, Sung AD, Sung HK, An TE, Kim KH, Park JK. Acupuncture Treatment for Chronic Pelvic Pain in Women: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Evid Based Complement Alternat Med. 2018 Sep 27;2018:9415897.
77. Chen C, Li X, Lu S, Yang J, Liu Y. Acupuncture for clinical improvement of endometriosis-related pain: a systematic review and meta-analysis. Arch Gynecol Obstet. 2024 Oct;310(4):2101-2114.
78. Kong J, Spaeth R, Cook A, Kirsch I, Claggett B, Vangel M, et al. Are All Placebo Effects Equal? Placebo Pills, Sham Acupuncture, Cue Conditioning and Their Association. PLoS One [Internet]. 2013 Jul 31 [cited 2025 Jul 4];8(7):e67485. Available from: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0067485

The following AI-supported tools were used only to optimize the language of the text between October 2024 to August 2025, in accordance with the applicable standards for good scientific practice of the Medical University of Graz:

- DeepL Translator
  Publisher/Provider: DeepL SE
  URL: https://www.deepl.com/de/translator
- ChatGPT (GPT-3.5 and GPT-4)
  Publisher/Provider: Open AI
  URL: https://chatgpt.com

# Appendix

- (none)