Acupuncture for female bladder pain syndrome: a randomized controlled trial

Larissa Bresler, MD,[1,2] Lauren C. Westbay, MD,[2] Lauren Hekman, BS,[3] Cara Joyce, PhD,[4] Colleen M. Fitzgerald, MD[2,5]

[1]Department of Urology, Loyola University Chicago Stritch School of Medicine, Maywood, Illinois, USA

[2]Department of Obstetrics and Gynecology, Division of Female Pelvic Medicine and Reconstructive Surgery, Loyola University Chicago Stritch School of Medicine, Maywood, Illinois, USA

[3]Loyola University Chicago Stritch School of Medicine, Maywood, Illinois, USA

[4]Department of Medicine, Loyola University Chicago, Maywood, Illinois, USA

[5]Department of Orthopedic Surgery and Rehabilitation, Loyola University Chicago Stritch School of Medicine, Maywood, Illinois, USA

BRESLER L, WESTBAY LC, HEKMAN L, JOYCE C, FITZGERALD CM. Acupuncture for female bladder pain syndrome: a randomized controlled trial. *Can J Urol* 2022;29(3):11154-11161.

Introduction: *Growing evidence supports acupuncture for several pain conditions including chronic prostatitis. This study aimed to determine the safety, tolerability, and effectiveness of acupuncture in reducing pain in women with interstitial cystitis/bladder pain syndrome (IC/BPS).*

Materials and methods: *This prospective randomized single-blinded study compared electro-acupuncture (EA) to minimal acupuncture (MA) after 6 weekly treatments and again after 6 weeks of no treatment. Pain was assessed using the Brief Pain Inventory-Short Form (worst pain, average pain, pain severity, pain interference) and the Pain Catastrophizing Scale (PCS). Physical exams evaluated pelvic floor muscle tenderness. Mixed-effects models were used to estimate adjusted means over follow up.*

Results: *Patients were randomized to EA (n = 11) or MA (n = 10). There were no adverse events. Both groups' worst pain improved at 6 weeks, -2.91 ± 0.59 and -2.09 ± 0.68 for EA and MA respectively with no difference between groups (p = 0.37). Results were similar at 12 weeks. The EA group had greater improvement in pain interference at 6 weeks, -3.28 ± 0.51 versus -1.67 ± 0.58 (p = 0.049). The between group difference was not maintained at 12 weeks (p = 0.13). Average pain and pain severity showed no difference between groups (p > 0.05). The PCS improved overall at 6 weeks, -6.2 ± 2.5 (p = 0.03), with no difference between groups (p = 0.39). On physical exam, only the EA group showed a significant decrease in levator ani tenderness (p = 0.031) after treatment.*

Conclusions: *Both EA and MA showed improvement in worst pain scores, however EA showed greater improvement in pain interference and pelvic floor muscle tenderness in women with IC/BPS.*

Key Words: interstitial cystitis, painful bladder syndrome, acupuncture therapy, female

Introduction

Interstitial cystitis/bladder pain syndrome (IC/BPS) affects nearly 7.9 million US adult women[1] and is a complex chronic pelvic pain condition characterized by bladder pain and associated lower urinary tract symptoms in the absence of infection or other obvious pathology.[2] IC/BPS is a multi-factorial disease with overlapping etiologies that is not well understood. Quality of life with IC/BPS is significantly reduced, particularly in those with concomitant pain comorbidities.[3] A stepwise approach to treatment is recommended,[4] however treatment options including pharmacotherapy and instillations have varied efficacy and associated side effects.[5,6] There is growing evidence to support acupuncture therapy as an alternative therapy for various types of pain,[7] including chronic prostatitis in men.[8-11] Additionally, over 80% of patients with IC/BPS already seek complementary and alternative medical (CAM) treatments.[12,13] However, there have been limited randomized controlled trials on acupuncture for women with IC/BPS. The goal

Accepted for publication April 2022

Acknowledgement
Mary Tulke, RN who functioned as chaperone and study coordinator.

Address correspondence to Dr. Lauren Westbay, Department of Obstetrics and Gynecology, Loyola University Medical Center, 2160 South 1st Avenue, Maywood, IL 60156 USA

of this study was to determine the safety, tolerability and efficacy of acupuncture in women with IC/BPS, with the hypothesis that acupuncture will be safe and tolerable, and that electro-acupuncture will be effective in the treatment of IC/BPS.

Materials and methods

This randomized, controlled, single-blinded study recruited women from a tertiary academic center. This trial was approved by the local Institutional Review Board prior to implementing the study protocol (ClinicalTrial.gov NCT02232282). Women with IC/BPS were eligible and IC/BPS was defined according to the American Urological Association (AUA) as an unpleasant sensation (pain, pressure, discomfort) perceived to be related to the urinary bladder, in the absence of infection or other identifiable pathology.[4] Inclusion criteria included women 21 to 65 years old, symptoms for > 6 months, and an average numeric rating bladder pain score of at least 3/10. Exclusion criteria included patients with pacemaker or neurostimulator, history of cystitis from radiation or medication therapy, systemic autoimmune disorder, systemic neuromuscular disease, history of urogenital cancer, pregnancy, current pelvic floor physical therapy, current opioid medications, abdominal or pelvic surgery within the last 6 months, or diagnosis of urinary tract infection within the past 3 months. Patients were required to refrain from use of opioids during the study. Women were randomized in a 1:1 ratio to receive electro-acupuncture (EA) or minimal acupuncture (MA), Figure 1. Participants, data collectors and statisticians were blinded to group assignment, however the physician acupuncturist was not blinded.

A board-certified urologist double boarded in medical acupuncture performed the acupuncture and the physical exam chaperoned by a registered nurse. Acupuncture needles were single use, sterile and disposable. All patients first received a standard acupuncture treatment protocol with 4 gates plus GV 20 to assess acupuncture naïve patients' response to needles during their first acupuncture encounter. Subsequent EA visits included administration of curious meridian Chong Mo paired with Yang Ming. 4 Hz low level electrical stimulation was applied. The control group received minimal acupuncture using superficial needle insertion at body locations not recognized as true acupoints and wired for electrical stimulation that was not actually applied. These described acupuncture treatments are well accepted treatment protocols for women with pelvic pain and bladder complaints,[14] Figure 1.

EA or MA was performed weekly for 6 weeks after an initial introductory session. Patients had a pelvic floor muscle physical exam at baseline, after 6 weekly treatments and again 6 weeks from the last treatment (12 weeks post-baseline). The physical exam included a Q-tip test for vulvodynia, myofascial exam for tenderness of the levator ani and trigone and an assessment of voluntary pelvic floor muscle function. All physical exams were chaperoned by a research nurse who recorded whether the patient reported tenderness. Although the examiner who performed the acupuncture was not blinded, the patient and the research nurse collecting the data during the exam were blinded to the acupuncture group. Patients completed the Brief Pain Inventory-Short Form (BPI-SF) and the Pain Catastrophizing Scale (PCS) at the same time intervals as the physical exam (baseline, after 6 weeks of treatment, and 12 weeks post-baseline). The BPI-SF included numerical rating scales of 0 to 10 for pain severity (worst pain, least pain, average pain, and current pain) and pain interference with daily activities associated with quality of life.[15] The PCS had 13 questions with a

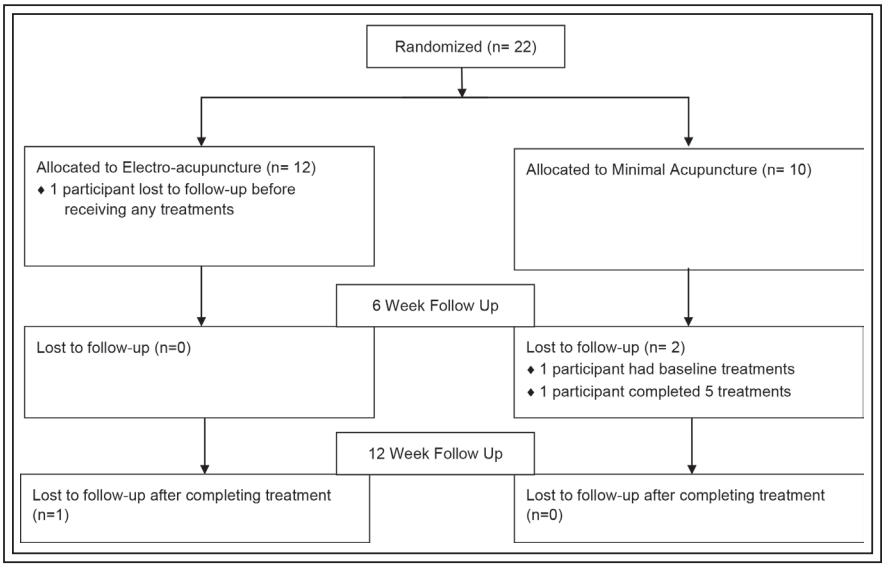

Figure 1. Randomization schema.

five point scale (0 to 4) and the score is a sum of the numerical responses (0 to 52).[16] Patient demographics were collected including age, self-reported race and ethnicity, vaginal parity, body mass index, menopausal and hormone replacement status, prior treatment for IC/BPS and other pelvic floor disorders, tobacco and alcohol use, prior medical and surgical history, medications including pain medications measured by the Medication quantification scale (MQS III),[17] allergies, and social history. Patients also provided a clean catch urine sample to rule out urinary tract infection and to compare microbiota of women with IC/BPS to healthy controls, data which has been previously published separately.[18]

The primary outcome was a change in BPI-SF worst pain score. Secondary outcomes include average pain and current pain score on the BPI-SF, pain interference score on the BPI-SF, PCS score, pelvic floor myofascial tenderness and function on standardized pelvic exam, and adverse events. Based on Crew et al a sample size of 11 in each group was calculated to yield > 80% power to detect a difference in means of 2.5 on the BPI-SF worst pain item at a 5% significance level, assuming a pooled standard deviation (SD) of 1.9.[19] A reduction of at least 2 points on the BPI-SF worst pain item is considered to be a clinically meaningful decrease based on the literature.[20] Although Crew et al studied a different pain population, it is a well-designed trial that evaluates acupuncture's effect on pain in women using the BPI-SF and similar trials have not been done in the IC/BPS population.[19] Linear mixed-effects models were used to estimate the mean and standard error (SE) for each acupuncture type at baseline, end of treatment, and at 12 weeks post-baseline. Differences in proportions with each tenderness outcome were assessed for statistical significance with exact McNemar's tests. Analyses were performed using SAS 9.4 (SAS Institute, Cary, NC, USA).

Results

Twenty-two patients were enrolled in the study. After one patient withdrew from the study prior to receiving any intervention, there were 11 patients randomized to EA and 10 patients randomized to MA. Two patients in the MA group were lost to follow up during the intervention phase of the study and one patient did not return to the 12-week follow up so there were only 18 patients with complete per protocol data, Figure 2. The patients that were lost to follow up did not indicate a reason. All patients tolerated the trial standard acupuncture treatment well prior to the study initiation. All patients tolerated the EA and MA well. There were no adverse events.

Among enrolled participants, the mean age was 50 years (SD 13), 71.4% identified as non-Hispanic white (n = 15), and 47.6% were post-menopausal (n = 10), Table 1. Patient demographics were similar between groups. Eighty-one percent of patients (n = 17) had associated overlapping pain comorbidities (e.g. fibromyalgia, endometriosis, irritable bowel syndrome, low back pain, vulvodynia) and 95.2% (n = 20) had previously tried second line treatments for IC/BPS based on AUA guidelines.[2]

At baseline the BPI-SF worst pain score was 5.45 (SE 0.66) for the EA group and 5.20 (SE 0.69) for the MA group. Overall, the worst pain score significantly improved at the end of treatment (after 6 weeks), -2.49 ± 0.45 ($p < 0.001$) with no significant difference between groups ($p = 0.37$). Similarly, the group overall showed improvement after 12 weeks with a decrease in score of -1.70 ± 0.48 ($p = 0.003$) with no difference between groups ($p = 0.17$), Table 2.

Table 2 also shows the BPI-SF average pain, pain severity, and pain interference scores. Overall, average pain improved at the end of treatment (6 weeks) (-1.50 ± 0.43, $p = 0.003$) and at 12 weeks (-1.18 ± 0.41, $p = 0.01$), but there were no between group differences at either time point ($p > 0.05$). Similarly, patients overall demonstrated improvement in pain severity at the end

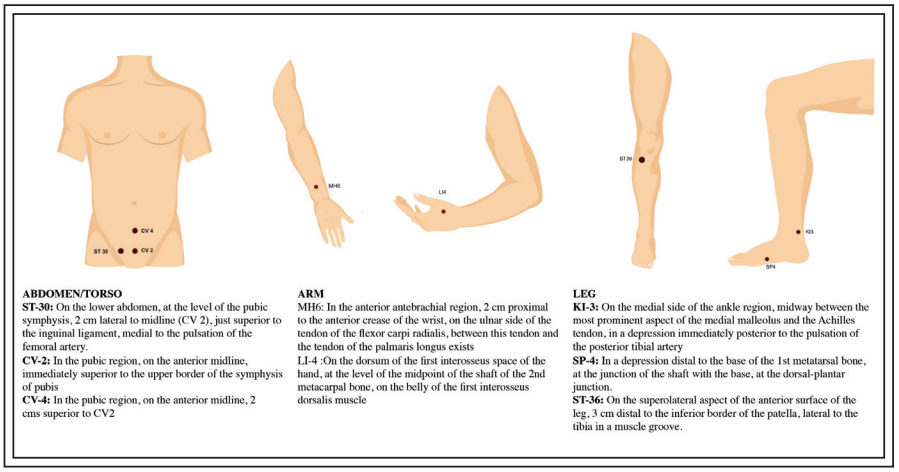

Figure 2. Location of electro-acupuncture acupoints.

TABLE 1. **Patient demographics and clinical characteristics**

	Overall n = 21	**Minimal acupuncture n = 10**	**Electro-acupuncture n = 11**
Age, years			
Mean ± SD	49.9 ± 13.1	49.0 ± 14.7	50.6 ± 12.1
Median (range)	50 (25-65)	53 (25-65)	47 (32-65)
Body mass index			
Mean ± SD	25.5 ± 5.9	27.1 ± 5.7	24.1 ± 6.0
Median (range)	25.0 (15.7-38.0)	26.2 (19.1-38.0)	24.0 (15.7-37.9)
Race, n (%)			
Non-Hispanic White	15 (71.4)	6 (60.0)	9 (81.8)
Hispanic	3 (14.3)	2 (20.0)	1 (9.1)
African American	1 (4.8)	1 (10.0)	0 (0.0)
Other	1 (4.8)	1 (10.0)	0 (0.0)
Prefers not to answer	1 (4.8)	0 (0.0)	1 (9.1)
Married, n (%)	14 (66.7)	7 (70.0)	7 (63.6)
College degree, n (%)	14 (66.7)	8 (80.0)	6 (54.5)
Postmenopausal, n (%)	10 (47.6)	5 (50.0)	5 (45.5)
Nulliparous, n (%)	8 (38.1)	5 (50.0)	3 (27.3)
Pain comorbidities, n (%)			
0	4 (19.0)	3 (30.0)	1 (9.1)
1	6 (28.6)	3 (30.0)	3 (27.3)
2	6 (28.6)	2 (20.0)	4 (36.4)
3	4 (19.0)	2 (20.0)	2 (18.2)
4	1 (4.8)	0 (0.0)	1 (9.1)
Depression, n (%)	8 (38.1)	3 (30.0)	5 (45.5)
Anxiety, n (%)	11 (52.4)	5 (50.0)	6 (54.5)
Sexual abuse, n (%)	2 (9.5)	1 (10.0)	1 (9.1)
Prior treatments, n (%)			
First-line	15 (71.4)	7 (70.0)	8 (72.7)
Second-line	20 (95.2)	10 (100.0)	10 (90.9)
Third-line	10 (47.6)	5 (50.0)	5 (45.5)

Pain comorbidities = fibromyalgia, endometriosis, irritable bowel, low back pain, vulvodynia
First line treatment = relaxation technique, yoga, IC diet
Second line treatment = pelvic floor physical therapy, biofeedback, amitriptyline, pentosane polysulfate, bladder installation
Third line = hydrodistension

of treatment (6 weeks) (-2.08 ± 0.34, $p < 0.001$) and at 12 weeks (-1.34 ± 0.48, $p = 0.01$) with no between group differences at either time point ($p > 0.05$). Finally, for pain interference, patients overall demonstrated improvement at both the end of treatment (6 weeks) (-2.48 ± 0.38, $p < 0.001$) and at 12 weeks (-1.74 ± 0.48, $p = 0.003$). However, unlike the other scores, there was a between group difference (0.98 ± 0.67, $p = 0.049$) at 6 weeks with greater improvement in the electro-acupuncture group compared to the minimal acupuncture group. The between group difference for pain interference scores was not maintained at 12 weeks ($p = 0.16$).

Patients overall demonstrated improvement in their pain catastrophizing scores at both the end of treatment (6 weeks) (-6.2 ± 2.5, $p = 0.03$) and at 12 weeks (-7.2 ± 2.5, $p = 0.08$). However, there was no difference between the groups at either time point ($p > 0.05$), Table 3.

Table 4 outlines the results of the physical exam. The EA group had a greater proportion of patients with a decrease in levator ani tenderness and impaired

TABLE 2. **Brief pain inventory scores by treatment group**

	Baseline	6 weeks	Change (6 weeks-baseline)		12 weeks	Change (12 weeks-baseline)	
	Mean (SE)		Mean (SE)	p value	Mean (SE)	Mean (SE)	p value
Worst pain							
Overall	5.33 (0.48)	2.83 (0.50)	-2.49 (0.45)	< 0.001	3.63 (0.68)	-1.70 (0.48)	0.003
MA	5.20 (0.69)	3.12 (0.75)	-2.08 (0.68)		4.20 (0.99)	-1.00 (0.72)	
EA	5.45 (0.66)	2.55 (0.66)	-2.91 (0.59)		3.06 (0.92)	-2.40 (0.65)	
Difference (MA-EA)	-0.25 (0.95)	0.57 (1.00)	0.83 (0.90)	0.37	1.14 (1.35)	1.40 (0.97)	0.17
Average pain							
Overall	4.36 (0.38)	2.86 (0.53)	-1.50 (0.43)	0.003	3.18 (0.49)	-1.18 (0.41)	0.01
MA	3.90 (0.56)	2.62 (0.80)	-1.28 (0.66)		2.99 (0.73)	-0.91 (0.61)	
EA	4.82 (0.53)	3.09 (0.70)	-1.73 (0.56)		3.37 (0.66)	-1.45 (0.54)	
Difference (MA-EA)	-0.92 (0.77)	-0.47 (1.07)	0.45 (0.87)	0.61	-0.38 (0.98)	0.54(0.81)	0.52
Pain severity score							
Overall	3.98 (0.35)	1.89 (0.38)	-2.08 (0.34)	< 0.001	2.64 (0.54)	-1.34 (0.48)	0.01
MA	3.45 (0.50)	1.86 (0.57)	-1.59 (0.51)		2.69 (0.80)	-0.76 (0.71)	
EA	4.50 (0.48)	1.93 (0.50)	-2.57 (0.44)		2.59 (0.73)	-1.91 (0.64)	
Difference (MA-EA)	-1.05 (0.70)	-0.07 (0.76)	0.98 (0.67)	0.16	0.10 (1.08)	1.15 (0.96)	0.25
Pain interference score							
Overall	4.28 (0.45)	1.80 (0.39)	-2.48 (0.38)	< 0.001	2.54 (0.60)	-1.74 (0.48)	0.003
MA	3.34 (0.66)	1.67 (0.59)	-1.67 (0.58)		2.32 (0.89)	-1.02 (0.72)	
EA	5.22 (0.63)	1.94 (0.52)	-3.28 (0.51)		2.76 (0.81)	-2.46 (0.64)	
Difference (MA-EA)	-1.88 (0.91)	-0.27 (0.78)	1.61 (0.77)	0.049	-0.44 (1.20)	1.44 (0.96)	0.16

MA = minimal acupuncture; EA = electro-acupuncture

pelvic floor muscle relaxation ($p < 0.31$) at 6 weeks compared to the MA group. This effect was not maintained at 12 weeks ($p > 0.05$).

Discussion

This study demonstrates that acupuncture is a safe and well tolerated treatment option for women with IC/BPS. Importantly, there were no adverse events in either group. And although both EA and MA had improved pain scores after 6 weeks of treatment, the EA group did show a significant improvement in pain interference scores after completing 6 sessions of treatment compared to the MA group. This suggests that patients receiving EA are reporting improved function despite similar improvement in pain scores between the EA and MA groups. This study was powered for worst pain scores based on prior

TABLE 3. **Pain catastrophizing scale**

	Baseline	6 weeks	Change (6 weeks-baseline)		12 weeks	Change (12 weeks-baseline)	
	Mean (SE)		Mean (SE)	p value	Mean (SE)	Mean (SE)	p value
Pain catastrophizing scale							
Overall	23.5 (2.2)	17.3 (3.0)	-6.2 (2.5)	0.03	16.4 (2.6)	-7.2(2.5)	0.08
MA	17.8 (3.1)	13.8 (4.6)	-4.0 (3.8)	13.9 (3.9)	-3.9 (3.6)		
EA	29.4 (3.0)	20.9 (4.0)	-8.5 (3.2)	18.8 (3.6)	-10.5 (3.3)		
Difference (MA-EA)	-11.6 (4.3)	-7.1 (6.1)	4.4 (5.0)	0.39	-5.0 (5.3)	6.6 (4.9)	0.29

MA = minimal acupuncture; EA = electro-acupuncture

TABLE 4. **Effect of acupuncture on physical exam**

	Baseline	End of treatment	p value	Baseline	12 weeks	p value
Electro-acupuncture	n = 11			n = 10		
Q-tip positive	3/10 (30.0)	3/10 (30.0)	0.99	2/9 (22.2)	1/9 (11.1)	0.99
Levator ani tenderness	7 (63.6)	1 (9.1)	0.031	6 (60.0)	3 (30.0)	0.25
Trigone tenderness	6 (54.5)	1 (9.1)	0.063	6 (60.0)	0 (0.0)	0.031
Impaired relaxation	10 (90.9)	4 (36.4)	0.031	9 (90.0)	6 (60.0)	0.25
Minimal acupuncture	n = 8			n = 8		
Q-tip positive	2/7 (28.6)	2/7 (28.6)	0.99	2/7 (28.6)	2/7 (28.6)	0.99
Levator ani tenderness	1 (12.5)	1 (12.5)	0.99	1 (12.5)	2 (25.0)	0.99
Trigone tenderness	3 (37.5)	4 (50.0)	0.99	3 (37.5)	1 (12.5)	0.50
Impaired relaxation	5 (62.5)	6 (75.0)	0.99	5 (62.5)	7 (87.5)	0.63

studies,[19] however pain interference of activities daily life is arguably as or more important in chronic pain patients than pain score. Similarly, recent work in a chronic pelvic pain multidisciplinary clinic looking at multiple patient-reported outcomes found improved pain disability over time.[21] Future studies would be beneficial to better understand how EA may improve IC/BPS patients' quality of life with or without discrete superior improvement in pain scores.

Recent work has noted that patients with chronic pelvic pain have high levels of pain catastrophizing that is worse in those with pain comorbidities.[22] Additionally, pain catastrophizing has been associated with poor resilience.[23] Addressing pain alone may not sufficiently treat the pain condition that may in part be exacerbated by the catastrophizing of residual pain or concern for the pain to return. Although there was no difference between groups in this study, patients overall did have improvement in the PCS with both MA and EA treatment. Furthermore, this study demonstrates that patients with high PCS scores can tolerate acupuncture well.

Additionally, this study is unique as it included both patient-reported outcomes with the BPI and PCS as well as physical exam findings. FitzGerald et al demonstrated the benefits of pelvic floor physical therapy for IC/BPS patients with pelvic floor tenderness and the AUA guidelines recommend pelvic floor physical therapy as second line treatment.[4,24] No other studies have investigated the effects of IC/BPS treatments on pelvic floor muscle tenderness. This study found a significant improvement in physical exam in the EA group with improved tenderness on pelvic floor exam and muscle function which was not see in the MA group after 6 weeks of treatment. This is particularly interesting considering there was no physical therapy being conducted during this study and no needles were inserted directly into pelvic floor musculature. The outcomes of improved pelvic floor muscle tenderness may reflect the overall benefit of acupuncture in muscle relaxation. Further studies with blind examiners would be beneficial to confirm this finding, but this study suggests acupuncture as a promising treatment option that can treat the myofascial pelvic pain that is found in IC/BPS patients. Additionally, future studies for any IC/BPS treatments should consider including physical exam findings of myofascial pelvic floor tenderness before and after treatment.

Of note, similar to other trials, the overall cohort had improvement in almost all domains studied including pain scores, pain catastrophizing and physical exam findings which suggests patients benefited even with minimal acupuncture.[8,10] Both the MA and EA groups met minimally clinically important difference of 30% improvement for all domains of the BPI after 6 weeks of acupuncture. Although MA is still an intervention, robust placebo response is seen in many randomized placebo-controlled trials for chronic pain. Although this adds challenges to interpreting the results of these studies, further research is needed to understand these placebo responses given the improvement can be even greater than responses to conventional therapies without any associated side effects. Vachon-Presseau et al have used MRI and fMRI to characterize neuroanatomic features associated with placebo responses in patients with chronic low back pain being treated with placebo pill versus no treatment.[25] Their findings suggest that there are structural and functional findings on brain imaging as well as psychologic traits

that may predict placebo responder in low back pain. It should be noted that MA group was not a placebo group since they were needled in non-traditional acupuncture points. This treatment also allowed for participants to rest in a meditative environment with IR heat lamp to the pelvis for 30 minutes providing measurable treatment response. Further studies to investigate the origin of improvement with MA in the IC/BPS is warranted given how well patients respond with a well-tolerated therapy.

Acupuncture is not currently part of the AUA guidelines for treatment of IC/BPS. However, more evidence is suggesting the benefits of acupuncture for both IC/BPS[26] as well as similar or overlapping conditions including chronic pelvic pain syndromes.[8] To our knowledge, this is one of the first randomized trial comparing EA to MA for IC/BPS in women and results are promising for the role of acupuncture in treating these patients, specifically in improving patient function. Furthermore, compared to pharmacologic and intravesical therapies for IC/BPS, acupuncture has almost no side effects. This study confirmed that there is little to no risk to acupuncture and suggests acupuncture referral is warranted despite additional research needed. Furthermore, acupuncture is gaining acceptance and insurance coverage, with Medicare coverage for acupuncture for chronic low back pain. This study also demonstrates that BPS acupuncture patients can achieve functional and pain improvements without opioid medications as each study participant was required to refrain from opioid use during the treatment and 12 weeks follow up. This data also suggests that acupuncture delivered by an average community provider will deliver some symptom improvement akin to our patients' response to MA. Finally, objective physical exam data in this study found that there is measurable local myofascial pain improvement in the EA group.

It should be noted that acupuncture studies have varied designs including use of manual/standard technique, microsystems applications such as auricular acupuncture, and acupuncture with electrical stimulation (EA). Based on the limited research that suggests EA to have neuromodulatory and anti-inflammatory results in both animal and human models[11,27-29] as well as the refractory nature of this study population's pain (almost all failing 2nd line treatment already), it was decided to use EA for the treatment group. However, there is a vast opportunity for future research in this domain.

There are a several limitations to this study. This study had a small sample size and further studies with greater power to detect important differences are needed. Additionally, despite the consistency of one provider doing all acupuncture and pelvic exams, this provider was unable to be blinded to the acupuncture allocations but was blinded to the questionnaire responses. Future studies including a blind examiner during the pelvic exam are needed.

Conclusions

Despite both minimal and electro-acupuncture demonstrating improved pain for patients, EA had greater improvement on pain interference with quality of life and pelvic floor muscle tenderness compared to MA at 6 weeks. This study suggests that acupuncture is a safe and effective treatment alternative for women with IC/BPS and encourages additional studies with larger sample sizes to further evaluate the effects of acupuncture in this population. □

References

1. Bogart LM, Berry SH, Clemens JQ. Symptoms of interstitial cystitis, painful bladder syndrome and similar diseases in women: a systematic review. *J Urol* 2007;177(2):450-456.
2. Hanno PM, Erickson D, Moldwin R, Faraday MM. Diagnosis and treatment of interstitial cystitis/bladder pain syndrome: AUA guideline amendment. *J Urol* 2015;193(5):1545-1553.
3. Suskind AM, Berry SH, Suttorp MJ et al. Health-related quality of life in patients with interstitial cystitis/bladder pain syndrome and frequently associated comorbidities. *Qual Life Res* 2013;22(7):1537-1541.
4. Hanno PM, Burks DA, Clemens JQ et al. AUA guideline for the diagnosis and treatment of interstitial cystitis/bladder pain syndrome. *J Urol* 2011;185(6):2162-2170.
5. Han E, Nguyen L, Sirls L, Peters K. Current best practice management of interstitial cystitis/bladder pain syndrome. *Ther Adv Urol* 2018;10(7):197-211.
6. Pearce WA, Chen R, Jain N. Pigmentary maculopathy associated with chronic exposure to pentosan polysulfate sodium. *Ophthalmology* 2018;125(11):1793-1802.
7. Vickers AJ, Cronin AM, Maschino AC et al. Acupuncture for chronic pain: individual patient data meta-analysis. *Arch Intern Med* 2012;172(19):1444-1453.
8. Qin Z, Zang Z, Zhou K et al. Acupuncture for chronic prostatitis/chronic pelvic pain syndrome: a randomized, sham acupuncture controlled trial. *J Urol* 2018;200(4):815-822.
9. Capodice JL, Jin Z, Bemis DL et al. A pilot study on acupuncture for lower urinary tract symptoms related to chronic prostatitis/chronic pelvic pain. *Chin Med* 2007;2:1.
10. Sun Y, Liu Y, Liu B et al. Efficacy of acupuncture for chronic prostatitis/chronic pelvic pain syndrome. *Ann Intern Med* 2021;174(10):1357-1366.
11. Lee S-H, Lee B-C. Electroacupuncture relieves pain in men with chronic prostatitis/chronic pelvic pain syndrome: three-arm randomized trial. *Urology* 2009;73(5):1036-1041.

12. O'Hare PG, Hoffmann AR, Allen P, Gordon B, Salin L, Whitmore K. Interstitial cystitis patients' use and rating of complementary and alternative medicine therapies. *Int Urogynecol J* 2013;24(6):977-982.
13. Lai HH, Vetter J, Song J, Andriole GL, Colditz GA, Sutcliffe S. Management of symptom flares and patient-reported flare triggers in interstitial cystitis/bladder pain syndrome (IC/BPS)-findings from one site of the MAPP Research Network. *Urology* 2019;126:24-33.
14. Helms J. Acupuncture energetics: a clinical approach for physicians. 1st ed. Theime Publishers;1995.
15. Cleeland CS, Ryan KM. Pain assessment: global use of the Brief Pain Inventory. *Ann Acad Med Singapore* 1994;23(2):129-138.
16. Sullivan MJL, Bishop SR, Pivik J. The pain catastrophizing scale: development and validation. *Psychol Assess* 1995;7(4):524-532.
17. Harden RN, Weinland SR, Remble TA et al. Medication quantification scale version III: update in medication classes and revised detriment weights by survey of American Pain Society Physicians. *J Pain* 2005;6(6):364-371.
18. Bresler L, Price TK, Hilt EE, Joyce C, Fitzgerald CM, Wolfe AJ. Female lower urinary tract microbiota do not associate with IC/PBS symptoms: a case-controlled study. *Int Urogynecol J* 2019;30(11):1835-1842.
19. Crew KD, Capodice JL, Greenlee H et al. Randomized, blinded, sham-controlled trial of acupuncture for the management of aromatase inhibitor-associated joint symptoms in women with early-stage breast cancer. *J Clin Oncol* 2010;28(7):1154-1160.
20. Farrar JT, Young JP, LaMoreaux L, Werth JL, Poole RM. Clinical importance of changes in chronic pain intensity measured on an 11-point numerical pain rating scale. *Pain* 2001;94(2):149-158.
21. Westbay LC, Adams W, Kistner M et al. Clinical outcomes of a multidisciplinary female chronic pelvic pain program. *Female Pelvic Med Reconstr Surg* 2021;27(12):753-758.
22. Chen A, Argoff C, Crosby E, De EJ. Chronic pelvic pain patients demonstrate higher catastrophizing in association with pelvic symptoms and comorbid pain diagnoses. *Urology* 2021;150:146-150.
23. Giannantoni A, Gubbiotti M, Balzarro M, Rubilotta E. Resilience in the face of pelvic pain: A pilot study in males and females affected by urologic chronic pelvic pain. *Neurourol Urodyn* 2021;40(4):1011-1020.
24. Fitzgerald MP, Payne CK, Lukacz ES et al. Randomized multicenter clinical trial of myofascial physical therapy in women with interstitial cystitis/painful bladder syndrome and pelvic floor tenderness. *J Urol* 2012;187(6):2113-2118.
25. Vachon-Presseau E, Berger SE, Abdullah TB et al. Brain and psychological determinants of placebo pill response in chronic pain patients. *Nat Commun* 2018;9(1):3397.
26. Sönmez MG, Kozanhan B. Complete response to acupuncture therapy in female patients with refractory interstitial cystitis/bladder pain syndrome. *Ginekol Pol* 2017;88(2):61-67.
27. Lee J-H, Jang K-J, Lee Y-T, Choi Y-H, Choi B-T. Electroacupuncture inhibits inflammatory edema and hyperalgesia through regulation of cyclooxygenase synthesis in both peripheral and central nociceptive sites. *Am J Chin Med* 2006;34(06):981-988.
28. Li Y, Yang M, Wu F et al. Mechanism of electroacupuncture on inflammatory pain: neural-immune-endocrine interactions. *J Tradit Chinese Med* 2019;39(5):740-749.
29. Kim H-W, Roh D-H, Yoon S-Y et al. The anti-inflammatory effects of low- and high-frequency electroacupuncture are mediated by peripheral opioids in a mouse air pouch inflammation model. *J Altern Complement Med* 2006;12(1):39-44.