ORIGINAL ARTICLE

Treatment of Recalcitrant Chronic Rhinosinusitis With Integrative East-West Medicine

A Pilot Study

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Objective: To establish the feasibility of studying the impact of integrative East-West medicine (IEWM) on sinonasal symptoms and quality of life (QOL) for patients with chronic rhinosinusitis (CRS).

Design: Prospective, nonrandomized trial.

Setting: Academic hospital and ambulatory clinic.

Patients: Patients with recalcitrant CRS offered treatment with IEWM in addition to standard medical treatment.

Methods: Prior to study enrollment, study participants were given the Sino-Nasal Outcome Test (SNOT-20) and the 36-Item Short Form (SF-36) questionnaires.

Interventions: Patients underwent 8 weeks of weekly acupuncture and counseling on dietary modification, lifestyle changes, and acupressure.

Main Outcome Measures: Patients completed posttreatment SNOT-20 and SF-36 surveys, which were compared for changes in sinonasal symptoms and QOL measures.

Results: Eleven patients completed the protocol. No adverse events were observed. There were trends toward improvement in most elements of the SNOT-20, whereas "need to blow nose" ($P=.002$), "runny nose" ($P=.04$), "reduced ability to concentrate" ($P=.005$), and "feeling frustrated, restless, or irritable" ($P=.046$) were statistically significant. In the SF-36, role physical ($P=.01$), vitality ($P=.04$), and social functioning ($P=.008$) were significantly improved.

Conclusions: Preliminary data suggest that an integrated approach of traditional Western medicine with IEWM is safe and may improve symptoms and QOL for patients with recalcitrant CRS. Future randomized controlled trials are needed to validate the effects of IEWM and clarify its role in the treatment of CRS.

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Chronic rhinosinusitis (CRS) is one of the most common diseases in the United States. According to the Centers for Disease Control and Prevention, 29.8 million adults were diagnosed with CRS in 2010, resulting in an estimated 12.5 million ambulatory care visits per year.[1] Chronic rhinosinusitis also has a considerable economic impact. In 1992, more that $200 million were spent for prescription antibiotics, nasal sprays, and decongestants, which is a fraction of the $2 billion that was spent on over-the-counter medications to treat sinusitis symptoms. By 1996, the total direct and indirect costs of CRS were estimated to be over $5 billion.[2]

Chronic rhinosinusitis has been shown to severely affect quality of life (QOL) and substantially impair daily functioning.[3] Gliklich and Metson[4] demonstrated notable decreases in scores for bodily pain, general health, vitality, and social functioning when comparing patients with CRS with the healthy population. Patients with CRS have been shown to have lower QOL scores than patients with congestive heart failure, chronic obstructive pulmonary disease, angina, and back pain.[4]

While the cause of acute rhinosinusitis is usually infectious, the pathogenesis of CRS is believed to be multifactorial, with environmental, general host, and local anatomic factors all contributing to its development.[5] Psychiatric conditions such as depression have also been shown to be important factors in the outcomes of patients treated for CRS.[6,7] For this reason, treatments for CRS commonly use multiple treatment modalities aimed to break the cycle of recurrent disease. However, to date, there is no consensus as to the optimal treatment algorithm for patients with

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CRS.[8] Success in the treatment of CRS, unlike in acute rhinosinusitis, is more variable and prone to relapse.[9]

Patient demand and dissatisfaction with conventional medicine have resulted in considerable interest in alternative medical treatments.[10] In the past 20 years, there has been an explosive increase in the use of complementary and alternative medicine (CAM) in the general population. In the United States, it is estimated that 40% of Americans use a form of CAM with an estimated cost of $21 billion annually.[11] Upchurch and Chyu[12] and Upchurch et al[13] from the University of California, Los Angeles (UCLA), demonstrated that 33.5% of American women used alternative medicine within the preceding 12 months in 1999, and in 2007 this rate increased to 40%.

To the best of our knowledge, this is the first study to use a comprehensive protocol of IEWM for patients with CRS. The goal of this pilot research study is to determine if alternative medicine is a safe and effective adjunctive treatment for patients with CRS.

METHODS

The purpose of this pilot study was to evaluate whether using integrative East-West medicine (IEWM), primarily consisting of acupuncture, acupressure, and dietary modification, in addition to the standard medical therapeutic regimen for CRS, can improve sinonasal symptoms and overall QOL. Our hypothesis is that CAM treatments are both safe and beneficial in the treatment of CRS. Institutional review board approval for this study was obtained through the UCLA Office for Protection of Research Participants, and recruitment began in July 2007. Potential participants were seen in the UCLA Head and Neck Surgery Clinic by the senior authors (J.D.S. or M.B.W.) and were interviewed and examined to determine participant eligibility.

INCLUSION CRITERIA

Participants had to have documentation of a diagnosis of CRS as defined by the Task Force for Defining Adult Chronic Rhinosinusitis[2] by a board-certified otolaryngologist. In addition to a complete head and neck physical examination, nasal endoscopy was used to confirm the diagnosis of CRS. Imaging studies, when available, were also reviewed. Participants also had to have clinically significant symptoms despite maximal traditional medical therapy (antibiotic course for 4-6 weeks, topical nasal steroids, decongestants, mucolytics, and nasal saline irrigations); had to be older than 18 years; and had to be able to give informed consent.

EXCLUSION CRITERIA

Exclusion criteria included having had sinus surgery within the past 3 months; previous acupuncture or acupressure treatment within the past 2 months; and having Samter's Triad, allergic fungal sinusitis, or nasal polyposis (all of which would likely not benefit from medical therapy alone and would likely require surgical intervention for treatment).

Eligible participants were asked if they would like to enroll in the research study. Because this study was not funded, the patients were required to pay for the interventions themselves. Many insurance plans provided partial coverage of the cost of treatment at the UCLA Center for East-West Medicine (CEWM). If they agreed, informed consent was given, and the patient was referred for 8 consecutive weekly sessions at the CEWM to undergo the treatments for a total of 2 months.

All patients completed 2 validated questionnaires prior to the start of IEWM, the 36-item Medical Outcomes Study Short Form-36 Health Survey (SF-36) and 20-item Sino-Nasal Outcome Test (SNOT-20), which represented their baseline QOL. The SF-36 is a validated general health QOL instrument.[14] It evaluates several domains of general QOL including physical function, social function, role limitations due to physical or emotional problems, mental health, energy and vitality, pain, and general health perception. The SF-36 is scored from 0 to 100, with a higher score indicating a better perceived health status. An average value is then calculated for the items in each of the 8 domains. Physical and mental health summary scores can be calculated for the SF-36 via summary scale scoring algorithms.[14]

The SNOT-20, designed in 1998, is a 20-question, disease-specific, QOL instrument designed to evaluate the effectiveness of treatments for CRS. The test has been shown to be reliable, valid, responsive, and easy to use and administer.[15,16] The patient rates the severity of their condition on each of the 20 items using a 0 to 5 category rating system. Scoring of the SNOT-20 is calculated as the mean item score for all 20 items. The possible range of SNOT-20 score is 0 to 5, with higher scores indicating greater rhinosinusitis-related health burden. The SNOT-20 change score is the difference between pretreatment and posttreatment total SNOT-20 score. Impact of treatment is assessed with the SNOT-20 change score.

During the first visit to the UCLA CEWM, the patients provided a full history and received a physical examination incorporating the theory and principles of traditional Chinese medicine by a board-certified internist (M.B.T.) who is also trained in East-West medicine. Participants were instructed to continue their Western medical therapy for CRS, which usually included a combination of nasal corticosteroid sprays and nasal irrigation. Participants received a full treatment of traditional Chinese medicine by licensed therapists, including acupuncture and therapeutic acupressure style massage of 20 minutes' duration each, for a total of 8 weekly sessions, along with patient education consisting of dietary counseling, lifestyle modifications, and self-acupressure.

Acupuncture treatment was individually tailored according to the principles of traditional Chinese medicine. For each session, up to 20 acupuncture points were selected that were either sinus specific or known to help improve QOL (**Table 1**). Sterile, disposable stainless steel needles (0.22 × 25.0 mm) were placed bilaterally along the face, arms, legs, hands, and feet with the patient in a supine position. Prior to needle insertion, the skin was disinfected with 70% isopropyl alcohol. The needles were gently manipulated with either rotation or thrusting techniques to achieve a "therapeutic sensation" described as either as a dull aching or tingling sensation from the needled point.

Acupressure, performed by licensed therapists, involved the application of firm pressure or kneading techniques, based on methods from traditional Chinese medicine, at certain acupoints and meridians found along the muscles and soft tissues of the face, head, neck, and shoulders.

Dietary recommendations were given according to an underlying traditional Chinese medicine pattern diagnosis. For example, if a patient was determined to have a "cold" pattern, a "warming" diet was advised, consisting of clear broths and spices like ginger. If a patient was found to have a "heat" pattern, a "cooling" diet, consisting of certain fruits (eg, watermelon, cantaloupe, honeydew, and Asian pears) and vegetables (eg, dark leafy greens, mint, and seaweed) was recommended. Patients were instructed to avoid dairy products.

Patients were also educated about performing daily self-acupressure of acupoints found on the hands, neck, and shoulders. Other lifestyle recommendations included stress management techniques and regular exercise regimens.

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Table 1. Acupuncture Point Locations and Indications[a]

Name	Location	Purpose
	Sinus Specific	
LI-4 (He Gu)	On the dorsum of the hand, at the midpoint of the second metacarpal bone, near its radial border	Nasal congestion, rhinorrhea, headache, "wind-cold" TCM pattern, neck pain, facial pain, stress
GB-20 (Feng Chi)	Near the base of skull, in the depression between the origins of the sternocleidomastoid and trapezius muscles	Nasal congestion, rhinorrhea, headache, "wind-cold" TCM pattern
ST-3 (Ju Liao)	Lateral to the nasolabial groove, level with the lower border of the ala nasi, directly inferior to the midpoint of the eye	Pain and swelling involving the maxillary sinus
LI-20 (Ying Xiang)	In the nasolabial groove, at the level of the midpoint of the lateral border of the ala nasi	Nasal congestion, rhinorrhea, anosmia
UB-2 (Zan Zhu)	Superior to the inner canthus, in a depression at the medial border of the eyebrow	Rhinitis, pain and swelling of the frontal sinus, frontal headache, "wind" TCM pattern
DU-23 (Shang Xing)	At the top of the head on the midline, 1 finger breadth posterior to the anterior hairline.	Nasal obstruction and discharge, headache, rhinitis
	Quality-of-Life Improvement	
LI-11(Qu Chi)	With the elbow flexed, at the lateral end of the transverse cubital crease	Loss of voice, sore throat, "heat" TCM pattern
SJ-5 (Wai Guan)	Three finger breadths proximal to the wrist crease, on the radial side of the extensor digitorum communis tendons	Headache, neck pain, "wind-heat" TCM pattern
GB-21 (Jian Jing)	Midway between the spinous process of C7 and the tip of the acromion, at the highest point of the trapezius muscle	Neck pain, cough, phlegm
P-6 (Nei Guan)	Three finger breadths proximal to the wrist crease in between the tendons of the palmaris longus and flexor carpi radialis	Anxiety, pain of the head and neck, cough
ST-36 (Zu San Li)	With the knee extended, 4 finger breadths below the patella, just lateral to the tibia within the tibialis anterior muscle.	Fatigue, vitality
LIV-3 (Tai Chong)	On the dorsum of the foot, in the depression distal to the junction of the first and second metatarsal bones	Headache, insomnia, stress, irritability

Abbreviation: TCM, traditional Chinese medicine.
[a] Adapted from Deadman et al.[17]

After the last visit to the CEWM, the patients were seen again at the Head and Neck Surgery Clinic, and they completed the SF-36 and SNOT-20 questionnaires again. Changes between pretreatment and posttreatment scores of the SF-36 and SNOT-20 were the main study end points. Data were used to compare differences between the initial and final QOL surveys, the SNOT-20, and SF-36. We compared pretreatment and posttreatment survey scores using 2-tailed *t* test with significance levels set at $P < .05$.

Table 2. Patient Demographic Information[a]

Patient No./ Sex/Age, y	Prior ESS, No.	Alcohol Use	Other Relevant Medical History
1/F/33	1	None	CRS
2/M/59	0	Occasional	CRS, vertigo
3/M/66	2	None	CRS, chronic bronchitis
4/M/66	0	None	CRS
5/F/38	3	None	CRS, allergic rhinitis
6/F/55	2	None	CRS
7/M/70	1	Occasional	CRS, GERD, allergic rhinitis, asthma
8/M/65	4	Occasional	CRS
9/M/52	1	Occasional	CRS, allergic rhinitis
10/M/45	1	None	CRS
11/M/32	0	None	CRS, allergic rhinitis

Abbreviations: CRS, chronic rhinosinusitis; ESS, endoscopic sinus surgery; GERD, gastroesophageal reflux disease.
[a] None of the patients used tobacco.

RESULTS

Eleven patients completed the 2-month protocol. There were 8 men and 3 women with a mean age of 53 years (range, 32-70 years). Eight of 11 patients (73%) had undergone at least 1 sinus surgery prior to starting the protocol. Additional patient demographic information is found in **Table 2**. Comments from the patients were mostly positive, with few complaints related to the time, expense, and trouble of a weekly physician's visit. No adverse effects were reported by study participants, and all patients who began treatment were able and willing to complete the full 8-week course. Data were analyzed using paired *t* test.

SF-36 DATA

The SF-36 data demonstrated significant improvement in multiple areas of patient QOL. Raw patient data are shown in **Table 3**. Patient 2 unfortunately was the only patient who did not fill out his posttreatment questionnaire during the immediate posttreatment visit. Instead, he completed the questionnaire 2 months afterward. He reported that he felt symptomatic benefit during and immediately after treatment, but he no longer felt any benefit at the time of the 2-month follow-up visit. The mean pretreatment and posttreatment scores for all 8 measures of health status demonstrate possible trends toward treatment effectiveness (**Table 4**). Patients reported statistically significant improvements in physical role ($P = .01$), vitality ($P = .04$), and social function ($P = .01$). Mental health also trended toward improvement with $P = .07$.

SNOT-20 DATA

Pretreatment and posttreatment scores from all 11 patients are shown in **Table 5**. The mean baseline SNOT-20 score was 2.03, and the mean posttreatment score was

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Table 3. Raw Pretreatment and Posttreatment 36-Item Short-Form Questionnaire Scores[a]

Patient No.	Physical Function		Role Physical		Bodily Pain		General Health	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	30.0	30.0	8.0	14.0	2.0	5.2	23.4	20.4
2	28.0	27.0	20.0	20.0	12.0	12.0	20.0	22.0
3	28.0	30.0	20.0	20.0	10.4	12.0	22.4	24.4
4	29.0	30.0	20.0	18.0	7.1	8.1	21.4	21.4
5	29.0	29.0	12.0	18.0	8.2	10.4	10.0	11.4
6	22.0	29.0	11.0	17.0	5.1	9.4	ND	15.4
7	25.0	21.0	9.0	13.0	7.4	10.0	18.4	22.4
8	28.0	30.0	16.0	20.0	8.2	12.0	ND	18.4
9	27.0	27.0	16.0	17.0	8.2	7.1	11.0	12.4
10	25.0	26.0	6.0	12.0	10.4	6.1	18.4	18.4
11	30.0	30.0	20.0	20.0	12.0	12.0	18.4	22.0

Patient No.	Vitality		Social Function		Role Emotional		Mental Health	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	8.0	13.0	7.0	8.0	9.0	15.0	19.0	23.0
2	18.0	17.0	8.0	8.0	15.0	15.0	23.0	22.0
3	18.0	19.0	10.0	10.0	15.0	15.0	24.0	24.0
4	15.0	15.0	6.0	9.0	13.0	12.0	16.0	19.0
5	13.0	13.0	4.0	5.0	15.0	15.0	23.0	22.0
6	10.0	12.0	7.0	8.0	12.0	13.0	14.0	18.0
7	14.0	14.0	6.0	7.0	15.0	13.0	20.0	19.0
8	11.0	17.0	6.0	10.0	13.0	15.0	16.0	21.0
9	9.0	12.0	6.0	9.0	11.0	14.0	16.0	19.0
10	7.0	9.0	4.0	5.0	6.0	13.0	12.0	15.0
11	16.0	16.0	10.0	10.0	15.0	12.0	22.0	20.0

Abbreviations: ND, not done by patient; post, posttreatment; pre, pretreatment.
[a]Norm-based transformation was not performed.

Table 4. Effect of Integrative East-West Medicine on Mean 36-Item Short-Form Questionnaire Scores[a]

SF-36 Domain	Pretreatment	Posttreatment	Δ Mean	*P* Value
Physical function	27.36	28.09	0.73	.38
Role physical	14.36	17.18	2.82	.01
Bodily pain	8.27	9.48	1.21	.14
General health	18.16	19.42	1.27	.11
Vitality	12.64	14.27	1.64	.04
Social function	6.73	8.09	1.36	.008
Role emotional	12.64	13.82	1.18	.24
Mental health	18.64	20.18	1.55	.07

[a]Mean scores for all 8 measures of health show positive difference (increased health-related quality of life).

1.54. The mean change in score was –0.49 ($P=.07$), which is trending toward improvement. There was significant improvement in scores in the following categories: need to blow nose ($P=.002$); runny nose ($P=.04$); reduced ability to concentrate ($P=.005$); and feeling frustrated, restless, or irritable ($P=.046$) (**Table 6**). There were trends toward improvement in scores for sneezing ($P=.053$), thick nasal discharge ($P=.053$), and facial pain or pressure ($P=.07$). Overall, there were improvements in mean scores in 17 symptoms and no change in 3 (dizziness, sadness, and embarrassment).

COMMENT

Acupuncture, acupressure, and dietary modifications have been staples of Eastern medicine for nearly 2 millennia. Despite increasing use in the United States, the benefits of these therapies have only recently begun to be investigated and accepted by the Western medical world. The results of this pilot study demonstrate that the use of IEWM is both safe and effective in the treatment of CRS. There were no reported adverse reactions during the study, and most patients reported treatment as a positive experience. Patients in this study had statistically significant improvement in several measures of QOL as measured by the SF-36 and SNOT-20 instruments.

In 1993, as a result of the increasing interest in alternative medicine, the National Institutes of Health created the Office of Alternative Medicine, which expanded into the National Center for Complementary and Alternative Medicine in 1998. Currently, over $122 million is appropriated for studies in this field. In 2003, 98

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Table 5: Sino-Nasal Outcome Test (SNOT-20) Pretreatment and Posttreatment Scores[a]

Patient No.	SNOT-20 Pretreatment	SNOT-20 Posttreatment	Δ
1	1.45	1.40	−0.05
2	1.25	1.65	0.40
3	1.30	0.80	−0.50
4	1.85	2.20	0.35
5	1.25	0.50	−0.75
6	3.45	1.80	−1.65
7	2.25	2.20	−0.05
8	3.00	1.20	−1.80
9	1.95	1.20	−0.75
10	2.55	2.45	−0.10
11	1.10	0.40	−0.70

[a] These scores reflect a mean value from a list of 20 sinonasal symptoms that patients must rank 1 thru 5 based on severity, 5 being the worst.

of 125 medical schools in the United States offered either elective or required courses in CAM.[18] A growing number of hospital systems are developing programs to include complementary approaches. In addition, most major insurers are beginning to integrate CAM into their benefits.[19] However, compared with traditional western modalities, there are few studies that have evaluated the effectiveness of IEWM in the treatment of CRS.

Acupuncture is the placement of disposable, sterile, single-use needles at specific points to elicit a specific therapeutic action. Acupuncture is gaining acceptance in the Western medical community as a viable complementary therapy to a variety of medical conditions, including rhinosinusitis.[20] Treatment for sinusitis and sinus symptoms is also well established in traditional Chinese acupuncture.[21] Acupuncture used to treat patients in this and other studies with sinusitis consists of using a variety of treatment sites to alleviate specific symptoms, including headaches, toothaches, facial pain and neck pain, stress, and anxiety.[22]

Research has demonstrated replicable physiologic effects of acupuncture, including changes in plasma levels of endorphins and enkephalins and stress-related hormones, such as adrenocorticotropic hormone.[23] Other diseases with similar symptoms, such as tension headaches, have been shown to be treatable with acupuncture.[24] Pothman and Yeh[25] demonstrated a favorable effect of acupuncture in the treatment of children and young adults with chronic maxillary sinusitis. Acupuncture has also been shown to reduce sinusitis-related pain in 60% of patients, compared with 30% with placebo.[26] A group from Germany demonstrated improvement in nasal airflow by anterior rhinomanometry and patency based on visual judgment after acupuncture based on traditional sites when compared with nonspecific control sites.[27] In an interesting study, Stavem et al[28] randomized 65 patients with CRS to 3 treatment groups for 4 weeks of the following treatments: (1) acupuncture alone, (2) sham acupuncture alone, and (3) medical management with antibiotics for 7 to 10 days, saline irrigation, a nasal decongestant spray, and a 14-day course of oral corticosteroids. All groups showed improvement from baseline in a variety of SF-36 and sinusitis-specific symptoms, but no 1 treatment showed any statistically significant advantage over another. Our study differs from this study because we feel that CAM is most effective when integrated with conventional medical therapy for CRS. We agree with Bell et al[29] that the sum total of Chinese medicine (diet, acupuncture, acupressure, lifestyle interventions, etc) is better than any single modality to address the unique, systemic imbalances in a given patient. Also, the choices of medications used in the medical treatment group are more commonly used in the treatment of acute exacerbations of CRS and not necessarily representative of typical, long-term medical therapy for CRS.

Acupuncture is considered to be very safe. One review demonstrated 2.4 serious adverse effects per 10 000 patients. Overall, mild and transient adverse effects were also infrequent, with minor bleeding at the site of the needling being the most common at 7% to 11% of all cases.[30]

Acupressure, another treatment modality used in this protocol, is an alternative to acupuncture often used in IEWM. For acupressure, a therapist will use his or her fingers or a variety of blunt instruments to apply the pressure on the desired location. Acupressure and acupuncture have been studied together and found to have beneficial effects to prevent postoperative nausea and vomiting, reduce postoperative pain, analgesic requirements, and opioid-related adverse effects after both upper and lower abdominal surgery, as well as reducing anxiety and behavior dysfunction.[31] Other benefits of acupressure in the literature include improvements in insomnia, depression, and symptoms of nausea.[32,33] Especially noteworthy is the absence of adverse effects related to acupressure. While, to our knowledge, no studies have been published documenting the use of acupressure for patients with CRS, acupressure has been proven to treat many of the symptoms common in CRS. Acupressure is also more easily adaptable to patient self-treatment. Chronic diseases, such as CRS, may need long-term treatment to maintain benefit, and patient-initiated interventions, such as self-acupressure, may be more easily maintained.

Diet analysis and modifications were also a component of the IEWM treatment protocol of this study. Studies have demonstrated that dietary modifications can change symptoms in patients with related diseases such as allergic rhinitis.[34,35] These changes may be mediated by the reduction of inflammatory mediators circulating through the body. Dietary supplements, such as polyunsaturated fatty acids, have been demonstrated to reduce serum eosinophils and leukotrienes in patients with asthma.[36]

The results of this study suggest a comprehensive protocol of IEWM medicine including acupuncture, acupressure, and dietary modification might be beneficial to reduce symptoms and improve QOL for patients with CRS. Physical role, vitality, and social function were all significantly improved. The results of the SNOT-20 pretreatment and posttreatment also demonstrated that IEWM elicited improvements in sinonasal symptoms. Patients had statistically significant improvements in the need to blow their nose; runny nose; reduced ability to concentrate; and feelings of frustration, restlessness, or irritability. While the second 2 symptoms are also re-

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Table 6. Mean Sino-Nasal Outcome Test (SNOT-20) Individual Pretreatment and Posttreatment Scores

Snot-20 Question	Pretreatment	Posttreatment	Change	*P* Value
Need to blow nose	2.91	1.64	–1.27	.002
Sneezing	1.45	0.73	–0.72	.054
Runny nose	2.36	1.55	–0.81	.04
Cough	2.09	1.36	–0.73	.25
Postnasal discharge	3.36	2.91	–0.45	.18
Thick nasal discharge	3.27	2.36	–0.91	.05
Ear fullness	1.45	0.73	–0.72	.15
Dizziness	0.45	0.45	0	>.99
Ear pain	0.73	0.27	–0.46	.21
Facial pain or pressure	1.82	1.18	–0.64	.07
Difficulty falling asleep	1.45	1.18	–0.27	.54
Wake up at night	1.91	1.82	–0.09	.76
Lack of a good night's sleep	2.18	2.00	–0.18	.66
Wake up tired	2.36	1.82	–0.54	.24
Fatigue	2.36	1.82	–0.54	.11
Reduced productivity	1.82	1.45	–0.37	.32
Reduced ability to concentrate	2.36	1.55	–0.81	.005
Feeling frustrated, restless, or irritable	2.09	1.45	–0.64	.046
Sadness	1.18	1.18	0	>.99
Embarrassment	1.27	1.27	0	>.99

lated to general well-being, the nasal symptoms of these patients seem to be affected positively by IEWM. As seen in Table 6, the symptoms of sneezing, thick nasal discharge, and facial pain or pressure were trending toward improvement.

There are several limitations to this study. Potential criticisms include a small sample size, lack of a control cohort, and a potential selection bias of a study population. The sample size of this pilot study was not intended for an efficacy analysis but rather to obtain an estimate of the effect size and variance necessary to plan a definitive study to test and refine individual components of the IEWM protocol. Another potential criticism of the current study is that we incorporated multiple treatments (acupuncture, acupressure, and lifestyle modification) together, potentially making it difficult to identify if a single modality is more beneficial than another to treat CRS. However, this decision was based on the philosophical foundation of CAM that emphasizes healing a person as a whole using a variety of coordinated and individualized interventions rather than a single treatment modality.[29] Future studies may include pretreatment and posttreatment imaging studies, sinus endoscopy, and possibly sinus biopsies as study end points.

In summary, we have conducted a successful pilot trial of IEWM as an adjuvant treatment for CRS. We believe our effort is an important first step in demonstrating the feasibility of a rigorous evaluation of IEWM for this indication. Although preliminary, our findings suggest that patients with CRS can achieve improvements in sinus-specific QOL measures with alternative medicine, as well as improvements in general health status. Future randomized controlled trials are needed to establish the efficacy and validity of IEWM as a treatment option for patients with CRS.

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Author Contributions: Drs Suh, Taw, and Wang had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. *Study concept and design:* Suh, Taw, Nguyen, and Wang. *Acquisition of data:* Suh, Wu, Taw, and Wang. *Analysis and interpretation of data:* Suh, Wu, Nguyen, and Wang. *Drafting of the manuscript:* Suh, Wu, Nguyen, and Wang. *Critical revision of the manuscript for important intellectual content:* Suh, Wu, Taw, Nguyen, and Wang. *Statistical analysis:* Wu. *Obtained funding:* Taw. *Administrative, technical, and material support:* Suh, Taw, Nguyen, and Wang. *Study supervision:* Suh, Taw, Nguyen, and Wang.

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